STERIS®

Maintenance Manual

MAINTENANCE MANUAL

SYSTEM 1®
Sterile Processing System

Models 89, 90 and 99 Processors

(04/01/02) P-764330-115

A Word From STERIS Corporation

ADVISORY

The operation and maintenance procedures recommended by STERIS are described in this manual. Only these recommended maintenance procedures should be followed.

A listing of the safety precautions to be observed when operating and servicing this equipment can be found in Section 1 of this manual. Do not operate or service this equipment until you have become familiar with this information.

Any alteration of this equipment not authorized or performed by STERIS Engineering Service which could affect its operation will void the warranty, could adversely affect efficacy of the sterile process, could violate federal, state, and local regulations, and could jeopardize your insurance coverage.

INDICATIONS FOR USE

The SYSTEM 1® Sterile Processing System is designed for rapid, safe, low-temperature sterile processing of immersible surgical and diagnostic devices at the site of patient care, in less than 30 minutes. The system uses STERIS 20™ chemical sterilant, which achieves its use-dilution within the processor. The processor is a tabletop, microprocessor-controlled device, in which the sterile process is performed, controlled, and monitored, and maintains the process parameters necessary to assure standardized and effective sterile processing.

IMPORTANT: All personnel involved in the use and maintenance of this equipment must carefully review and comply with the warnings, cautions, and instructions contained in this manual. These instructions are important to protect the health and safety of personnel operating or servicing the equipment and should be retained in a conveniently accessible area for quick reference.

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Manufactured Exclusively by STERIS Corporation Mentor, OH	**ISO 9004 EN 46001 ISO 13485 Certified**

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Section 1: Listing of Warnings and Cautions

Following is a listing of safety precautions which must be observed when operating or servicing this equipment. WARNINGS indicate the potential for danger to personnel, and CAUTIONS indicate the potential for damage to equipment. These precautions are repeated (in whole or in part), where applicable, throughout the manual.

Observance of these safety precautions will minimize the risk of personal injury and/or the possible use of improper maintenance methods which may damage the unit or render it unsafe. It is important to understand that these precautions are not exhaustive. STERIS could not possibly know, evaluate and advise maintenance departments of all conceivable ways in which maintenance might be done or the possible hazardous consequences of each way.

WARNING – PERSONAL INJURY AND/OR EQUIPMENT DAMAGE HAZARD:

⚠ **Safe and reliable operation of this equipment requires regularly scheduled preventive maintenance, in addition to the faithful performance of routine maintenance. Contact STERIS Service to schedule preventive maintenance.**

⚠ **Repairs and adjustments to this equipment must be made only by fully qualified service personnel. Maintenance performed by inexperienced, unqualified personnel or installation of unauthorized parts could cause personal injury, invalidate the warranty, or result in costly equipment damage. Contact STERIS regarding service options.**

⚠ **Operating instructions are listed in this manual for service personnel reference. Equipment users should refer to the SYSTEM 1 Operating Manual.**

⚠ **Do not use the SYSTEM 1 until it has been properly installed and its electromechanical performance has been verified.**

⚠ **The SYSTEM 1 may be used only in hospital-grade rooms when it is installed according to the applicable specification (VDE 0107, Class 1, Group C NFPA rating).**

⚠ **The SYSTEM 1 is not intended for operation in explosion-endangered areas.**

⚠ **Danger: Risk of explosion if used in the presence of flammable anesthetics.**

⚠ **Risk of Fire: Replace power supply fuse with proper type as marked.**

⚠ **The SYSTEM 1 is not protected against water spillage or spray. Take precautions in the use of liquid during cleaning or insertion of devices.**

⚠ **Connect the SYSTEM 1 to a hospital-grade, GFI electrical receptacle only, to prevent electrical shock hazard.**

WARNING – FALL HAZARD:

⚠ **To prevent falls, keep floors dry by immediately wiping up any spilled liquids in the SYSTEM 1 loading and unloading areas.**

Continued ...

WARNING – ELECTRIC SHOCK AND BURN HAZARD:

⚠ Disconnect all utilities to the SYSTEM 1 before servicing. Do not service the unit unless all utilities have been properly locked out. Always follow OSHA Lockout-Tagout and electrical safety-related work practice standards. (See 29 CFR 1910.147 and .331 through .335.)

WARNING – STERILITY ASSURANCE HAZARD:

⚠ Failure to thoroughly clean devices prior to processing may result in an ineffective sterile process.

⚠ Use the Quick Connect adapter specifically designed for the device being processed.

⚠ Do not use Sterilant Concentrate after the expiration date indicated on the label.

⚠ Do not substitute any other product for STERIS 20™ Sterilant Concentrate.

⚠ Always verify that the sterilant container is empty at the end of the cycle.

⚠ Devices are not sterilized and/or adequately rinsed when a sterile processing cycle is cancelled.

CAUTION – POSSIBLE EQUIPMENT DAMAGE HAZARD:

⚠ Do not force lid to close.

⚠ After a cycle is cancelled, if fluid remains in the chamber, call STERIS.

⚠ When replacing the control board, use care when picking up the sheet metal/board assembly, because the display and printer cables are still connected under the board.

⚠ In the Service Mode, do not energize Heater unless chamber is full of water; element failure will occur.

⚠ In the Service Mode, do not energize Seal Relief Valve/Compressor with water in the chamber; spill will occur.

⚠ To prevent damage to the SYSTEM 1, potential fluid leakage, and failure of the sterile filter membrane, limit inlet water pressure to 60 psi.

⚠ To avoid jamming paper in printer, do not force paper into printer mechanism and do not attempt to feed uneven, tattered, wrinkled paper.

⚠ To avoid damage to the SYSTEM 1 prior to boxing for shipment, follow procedures 2.4.2 to aid in the process.

⚠ Do not place hard or rigid suctioning devices into the probes. Damage to thermocouples or concentration probes could occur.

Section 2: General Information

2.1 GENERAL

This Maintenance Manual is applicable for SYSTEM 1® Sterile Processing System, Models 89A1, 90B1, 90A1, 90A2, 99A1 and 99A2.

2.2 TECHNICAL SPECIFICATIONS

2.2.1 Overall Size

Width:	32" (813 mm)
Depth:	24" (610 mm)
Height:	
• Lid Closed:	13" (330 mm)
• Lid Open:	32" (813 mm)

2.2.2 Weight

Dry:	115 lbs (52 kg)
Operating:	150 lbs (68 kg)
Shipping:	200 lbs (91 kg)

2.2.3 Utility Requirements

Electrical

	89A1, 90B1, 90A2 and 99A2
• Voltage:	120 VAC (+5 %/-10 %)
• Frequency:	60 Hz
• Service Required:	20 Amps*

	90A1, 99A1,
• Voltage:	230 VAC (+5%/-10%)
• Frequency:	50 Hz
• Service Required:	10 Amps*

*Hospital-grade GFCI receptacle.

Water Requirements

- Pressure: 40 to 50 psi (276-345 kPa).
- Flow Rate: 4 gpm (15 lpm) at 40 psi (276 kPa).
- Temperature: 43° to 48°C (110° to 118°F).

  For optimum cycle time, water temperature should be between 46° to 48°C (115° to 118°F).
- Connection: 3/4" (190 mm) male hose connector.
- Quality: Potable/tap water.
- Drain: 1-1/4" (318 mm) I.D. (minimum) non-backpressuring drain.
- Supply Line: 1/2" (127 mm) I.D. (minimum) 3/4" (190 mm) I.D., optimum. Backflow prevention by others.
- Water Usage: Approximately 13.3 gal (50 L) per sterile processing cycle.
- Peak Consumption: 16 lpm (4 gpm)

2.2.4 Environmental Conditions

- Temperature: 16° to 32°C (60° to 90°F).
- Humidity: 10 to 90%, non-condensing.

2.2.5 General Installation Location Recommendation

The processor shall be installed and operated outside of patient environment exemplified in Figure 2-1.

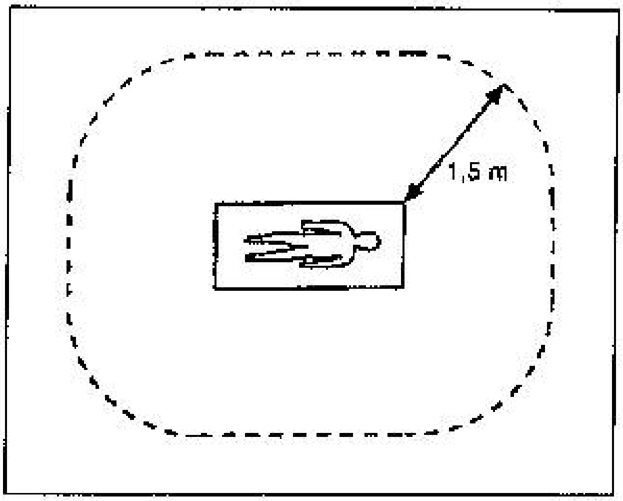

Figure 2-1. Processor Placement

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2.3 INSTALLATION CHECKOUT PROCEDURE

2.3.1 Purpose

This installation checkout procedure, when closely adhered to, will provide:

- Uniform procedures for all installations.
- Complete environmental data for future technical assistance.
- Means to request customer assistance in environmental effects.
- Assurance that SYSTEM 1 is functioning at maximum level.
- Data to track start-up reliability.

2.3.2 General Guidelines

An installation report is to be completed every time an installation checkout is performed, a unit has been moved to a new location, or major change has been made to the existing location.

NOTE: When installation checkouts are being performed on more than one unit, a new installation report must be completed for each SYSTEM 1.

Refer to the applicable sections for definitions and use of particular entries. If there is any confusion regarding these instructions or completion of the installation report, contact your supervisor for direction. Items marked with an (*) are not applicable to international installation reports.

2.3.3 Distribution

There is only one copy to the installation report. The installation report should be attached to the corresponding field service report and returned to STERIS Field Service.

2.3.4 Procedure

The installation report form should be used to obtain all information about the customer and the SYSTEM 1 at every installation checkout visit.

Complete the form in the following manner:

• CUST. NO:	Enter complete customer number
• CUST:	Enter full name of customer facility.
• MODEL NO:	Enter model number of SYSTEM 1 (current model numbers are: 90A2, 99A2 (120 VAC, 60Hz) or 90A1/ 99A1 (220-240 VAC, 50Hz).
• ADDRESS:	Enter address of facility where SYSTEM 1 is located.
• SERIAL NO:	Enter serial number of SYSTEM 1.

2.3.5 Electrical Utilities

• GFI OUTLET, GFI BREAKER OR ISOLATED POWER:	Enter the type of electrical outlet: standard GROUND FAULT INTERRUPTED outlet, GFI breaker or ISOLATED POWER.
• VERIFIED TRIP:	Check if GFI or (LIM) had been observed to trip by using a test button or GFI tester.
• DUAL/SINGLE RECEPTACLE:	Circle one that applies.
• NEMA 5-20R/ OTHER*:	Circle if NEMA series 5, 20 AMP, receptacle is provided and is of hospital grade. Describe any other conditions.
• DEDICATED LINE/OTHER:	Circle if the electrical outlet is on a dedicated electrical circuit and rated for 20 amps (90A2/ 99A2) and 10 amps (90A1/ 99A1). Describe an other conditions.
• COMMENTS:	Note any unusual conditions or additional useful information.

2.3.6 Water Inlet

• DUAL/SINGLE PREFILTER*:	Circle one that applies.
• ADDITIONAL PREFILTERS*:	Indicate the type (preferably in micron rating) and location of any additional prefilters installed.
• TIME VS> TEMPERATURE:	Measure and chart the water temperature at a sampling of intervals to show at what rate the temperature rises and becomes stable. This should be done without the prefilter elements in place, using your hand terminal or service mode to open the dump (S05) solenoid valve. Monitor water flow for at least five minutes. This should be done before water has been permitted to run through the system.
• AVAIL PRESS*:	Enter the static available water pressure (in psi), with no water flowing, at the inlet to the SYSTEM 1.
• INLET PRESS*:	Enter the water pressure (in psi), while filling, at the inlet to the SYSTEM 1.

2.3.7 Fill Times

• ENTER THE FILL TIME (IN SECONDS), AND THE NUMBER OF FILLS	By measuring the first and last fill times, factoring in the number of fills between the two and interpreting the FP readings, between 29 and 30, you will get an indication of water pressure, supply line capacity, and (at least on a short term basis) water quality.

and last fill times, factoring in the number of fills between the two and interpreting the FP readings, between 29 and 30, you will get an indication of water pressure, supply line capacity, and (at least on a short term basis) water quality.

2.3.8 Drain

• DISTANCE TO STANDING WATER:	Record, in inches, the distance from end of drain hose (or drain fitting) to standing water.
• DEDICATED/ SHARED:	Circle the appropriate choice. If drain is shared, describe how.
• COMMENTS:	Note any unusual conditions, potential problems or additional information.

2.3.9 Verification

In most installations, at least one diagnostics and two consecutive sterilization cycles should be run. If the customer has already run cycles; verification should include at least one diagnostics and one sterilization cycle.

• TRAYS TESTED:	Indicate trays tested.
• DIAGNOSTICS CYC:	Indicate cycle count, start time, readings of stored variables and who ran the cycle. Enter "F" for DIAGNOSTICS run by the field service representative, or "C" for DIAGNOSTICS run by the customer.
• FZ VALUE:	Enter the value of the variable FZ (in counts).
• FP VALUE:	Enter the value of the variable FP (in counts).
• CP VALUE:	Enter the value of the variable CP (in counts).
• CZ VALUE:	Enter the value of the variable CZ (in counts).
• PS VALUE:	Enter the value of the variable PS (in counts).
• FF VALUE*:	Enter the value of the variable FF (in counts).
• HP VALUE*:	Enter the value of the variable HP (in counts).
• HPC VALUE*:	Enter the value of the variable HPC (in counts).
• HPF VALUE*:	Enter the value of the variable HPF (in counts).
• STERILIZATION CYC:	Enter the cycle count for the sterilization cycle being recorded.
• TEMP	Enter the temperature range from the printout.
• CONC	Enter the concentration reading from the printout.

NOTE: (*) indicates not used Model 99 units.

2.4 RETURN MATERIALS AUTHORIZATION PROCEDURE

Before the shipment of the return of any SYSTEM 1, or other materials to the STERIS Corporation, a return materials authorization (RMA) number must be obtained. The RMA number can be obtained by calling Customer Service at STERIS 800-333-8828.

2.4.1 Shipping Precautions

Before shipping the SYSTEM 1, certain precautions should be followed to avoid:

1. The possibility of fluids freezing during transport.
2. The possibility of physical damage.
3. The loss of data.
4. The loss of components.

The precautions below are intended for use by all STERIS employees representatives, including those trained in the service of the SYSTEM 1.

CAUTION: To avoid damage to the SYSTEM 1 prior to boxing for shipment. Follow procedure 2.4.2 to aid in the process.

2.4.2 Draining the SYSTEM 1 Prior to Shipment

All possible water should be drained form the SYSTEM 1 prior to boxing for shipment. The following procedure is meant to aid in the process.

1. Unplug the SYSTEM 1.
2. Remove all hoses from the inlet and the drain to allow draining pressures to be equalized.
3. Remove any adapter trays and containers from inside the chamber of the SYSTEM 1.
4. Remove the sterile water filter by unscrewing the sterile filter housing cap from the sterile filter housing body and lifting out the filter.
5. Suction out all possible water from inside the sterile filter housing body, including any water inside the stand-pipe located in the center of the body opening.
6. Suction out all possible water from inside the three (3) connecting water probes located inside the SYSTEM 1 adapter chamber (drip pan).

CAUTION: Do not place hard or rigid suctioning devices into the probes. Damage to thermocouples or concentration probes could occur.

7. Repeat steps 5. and 6. until visible water is gone.

2.4.3 Boxing Procedure

After the SYSTEM 1 has been drained of water, it can be boxed. The boxing procedure should be followed to avoid.

- Damage during shipment
- Improper handling by shippers
- Unsafe transit of any problematic conditions or data

NOTE: If the original shipping container and parts have been discarded, contact STERIS for delivery of approved boxes and shipping hardware. STERIS will provide any packaging materials required to assure safe transport of the SYSTEM 1 and accessories returning to STERIS.

1. Insert the SYSTEM 1 into the styrofoam end caps (two provided).
2. Lift the SYSTEM 1 with end caps into the lower shipping box. The unit will drop into the box, feet first, with the electrical line cord coiled up in the center of the back of the unit. Two people should perform this task in order to reduce the possibility of injury.
3. Insert any printed materials or data that will accompany the unit in the front of the box between the end caps.
4. Place the top half of the box over the lower half of the box and fasten together with shipping straps.

NOTE: This shipping box does not need to be strapped to a shipping skid, unless required by a specific freight carrier.

5. This completes the boxing procedure.

2.4.4 SYSTEM 1 Specifications

Width:	32" (813 mm)
Depth:	24" (610 mm)
Height (Lid Closed):	13" (330 mm)
Weight:	115 lbs (52 kg)
Shipping:	200 lbs (91 kg)

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Section 3: Operating Instructions

3.1 THE STERIS PROCESS™

These instructions are included for reference purposes only. When operating the SYSTEM 1® Sterile Processing System, always refer to the Operator Manual shipped with your unit.

The fundamental technology of STERIS is a liquid chemical process for the rapid, safe, low temperature destruction of microorganisms on inanimate surfaces.

The STERIS PROCESS is a sterile processing method for immersible surgical and diagnostic devices at or near the site of the patient procedure. The STERIS PROCESS enables sterile processing of devices in less than 30 minutes – Just in Time for use, thus minimizing device downtime between patient procedures.

The entire STERIS PROCESS takes place within the SYSTEM 1, a tabletop microprocessor-controlled device, in which the sterile process is performed, controlled, and monitored.

First, the processing chamber is sealed. Sterile water enters the chamber and mixes with the sterilant to prepare the use-dilution. Use-dilution fills the chamber and is heated to a temperature in the range of 50° to 55°C (122° to 131°F).

Next, the use-dilution is circulated around and through the devices, processing chamber, and the unit's fluid pathway, including the sterile water filter, for 12 minutes.

Finally, the environmentally safe use-dilution is drained from the processing chamber. The device(s) and the chamber are rinsed four times with sterile water. Sterile processing is completed and the device(s) are ready for use.

3.2 OPERATING PROCEDURE FOR MODEL 99A1 AND MODEL 99A2

NOTE: Operating procedures for Model 89A1, 90B1, 90A1 and 90A2 units are found in Section 3.5.

⚠ **DANGER: Risk of explosion if used in the presence of flammable anesthetics.**

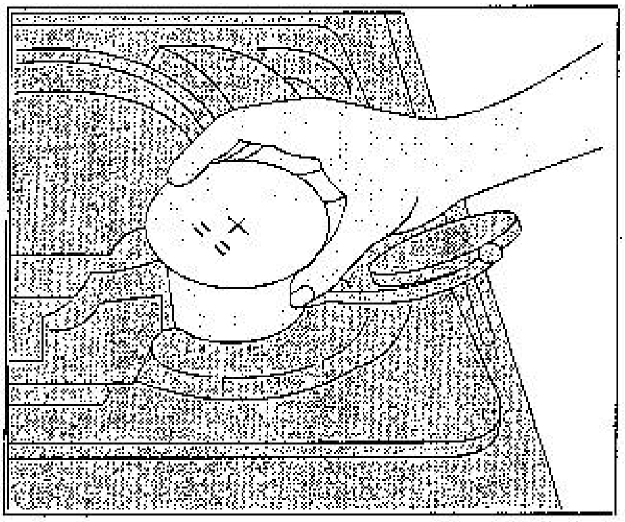
⚠ **WARNING: Prior to use, thoroughly read and be familiar with the SYSTEM 1 Operator Manual and all additional warning and caution statements in the appendices. The SYSTEM 1 should be operated only by trained personnel in the manner described in the SYSTEM 1 Operator Manual.**

Step. 1. Prepare and Load Items.

⚠ **WARNING: Failure to thoroughly clean devices prior to processing may result in an ineffective sterile process.**

⚠ **WARNING: Use the Quick Connect adapter specifically designed for the device being processed.**

Prepare and load items to be processed as described in the SYSTEM 1 Operator Manual, and according to the appropriate Quick Connect instructions.



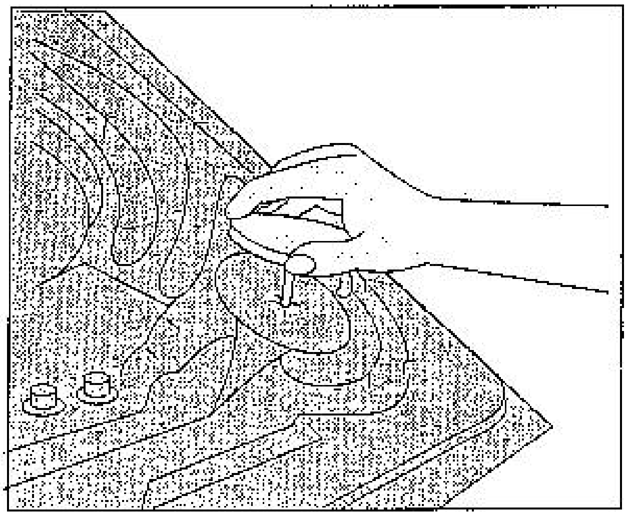
Step 2. Add STERIS 20™ Sterilant Concentrate.

⚠ **WARNING : Do not substitute any other product for STERIS 20 Sterilant Concentrate.**

⚠ **WARNING: Do not use STERIS 20 Sterilant Concentrate after the expiration date indicated on the label.**

The sterilant compartment is located in the lower right-hand corner of the processing tray.

Push sterilant container down until the lid is flush with the tray.



Step 3. Insert Aspirator Probe.

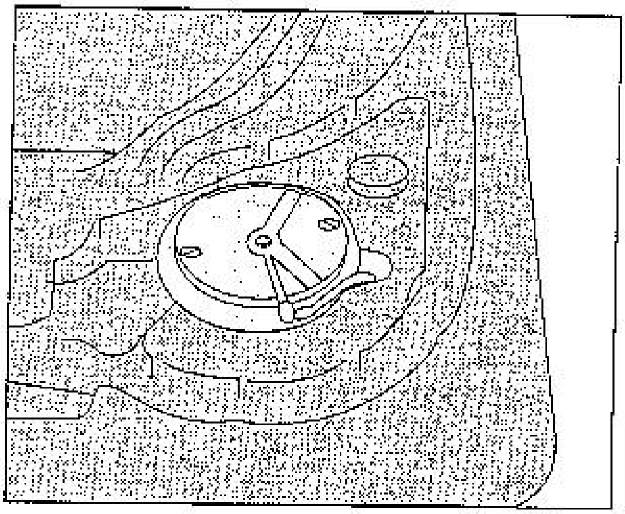
Line up the tip of the aspirator probe over the cross-cuts located in the center of the sterilant lid.

Insert the probe in a downward motion until the top of the aspirator is resting on the lid of the sterilant.

ASPIRATOR PROBE ASSEMBLY IN CORRECT POSITION

The illustration (at right) shows the correct position of the aspirator probe assembly. When the probe is placed into the sterilant cup, the connected flexible tube should be in the 5 o'clock position.

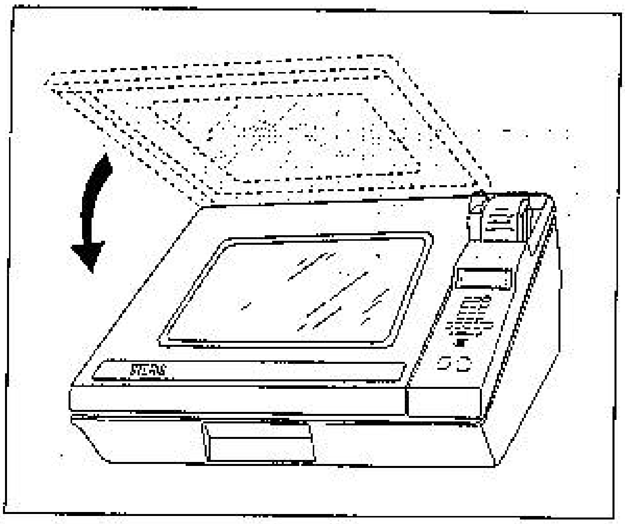
BE MINDFUL AND OBSERVANT–TUBING MUST NOT BE KINKED AT ANY POINT.



Step 4. Close lid.

⚠ **CAUTION: Do not force lid to close.**

If resistance is met, STOP, inspect positioning of the processing tray/container, device and aspirator assembly.



Step 5. How to Start a Sterile Cycle.

Refer to Figure 3-1. How to Start a Sterile Cycle (Flowchart).

- If No Options Are Enabled

NOTE: The screen will not advance (cycle cannot be started) until the lid is closed.

Close the lid. When the lid is closed, display shows:

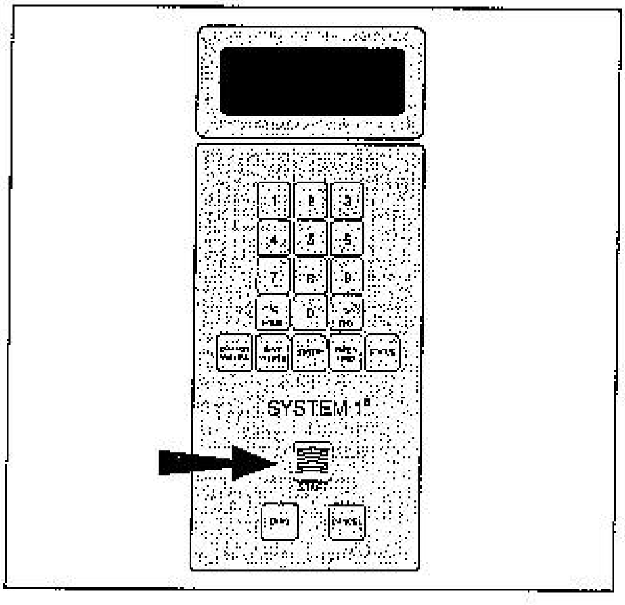
READY
11:34AM 07/08/99

(Current time and date)

... alternating with ...

PRESS START
TO BEGIN CYCLE

Press the START touch pad to run a Sterile Cycle.



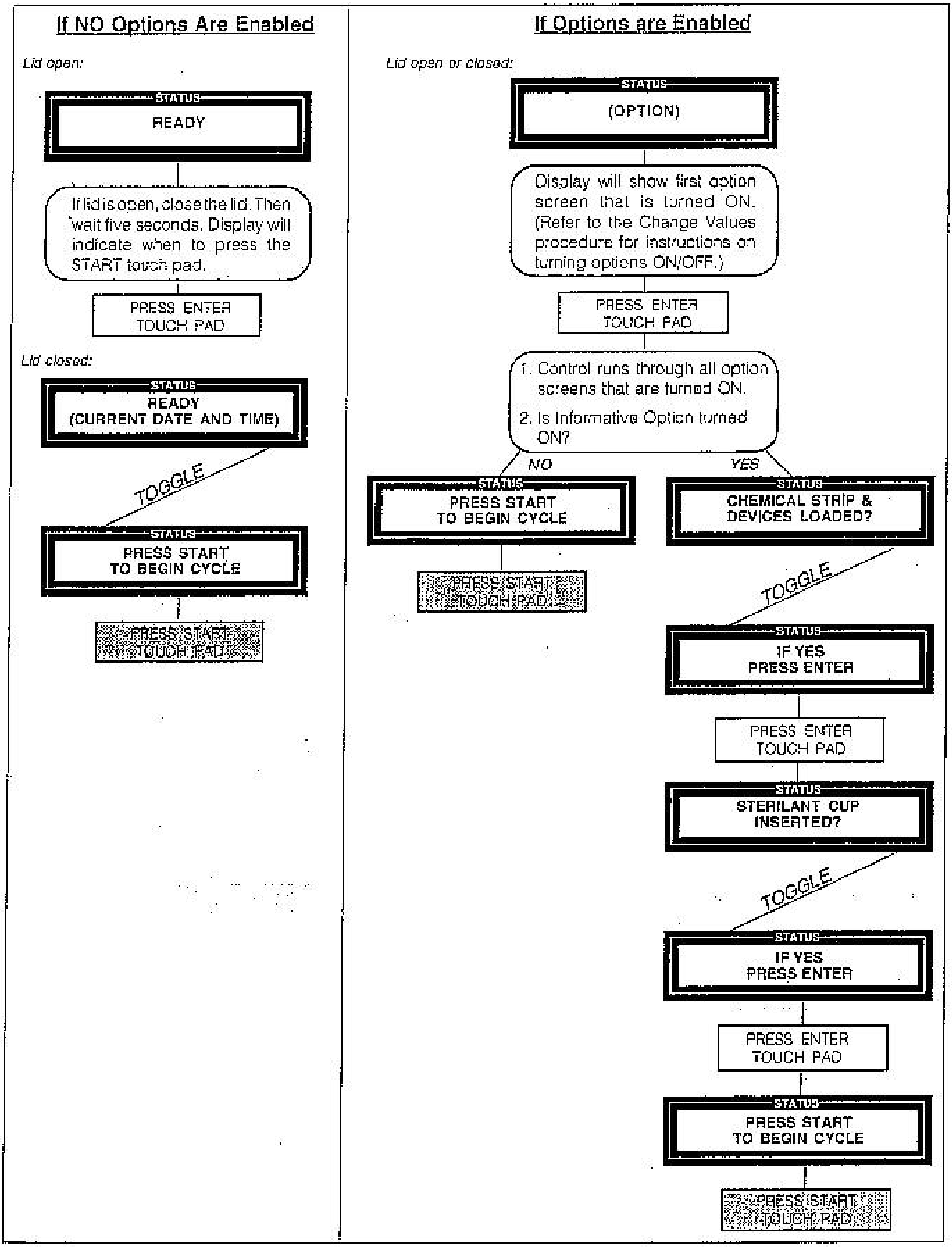

If NO Options Are Enabled
Lid open:
STATUS
READY
If lid is open, close the lid. Then wait five seconds. Display will indicate when to press the START touch pad.
PRESS ENTER TOUCH PAD
Lid closed:
STATUS
READY (CURRENT DATE AND TIME)
TOGGLE
STATUS
PRESS START TO BEGIN CYCLE
PRESS START TOUCH PAD
If Options are Enabled
Lid open or closed:
STATUS
(OPTION)
Display will show first option screen that is turned ON. (Refer to the Change Values procedure for instructions on turning options ON/OFF.)
PRESS ENTER TOUCH PAD
1. Control runs through all option screens that are turned ON.
2. Is Informative Option turned ON?
NO
YES
STATUS
PRESS START TO BEGIN CYCLE
PRESS START TOUCH PAD
STATUS
CHEMICAL STRIP & DEVICES LOADED?
TOGGLE
STATUS
IF YES PRESS ENTER
PRESS ENTER TOUCH PAD
STATUS
STERILANT CUP INSERTED?
TOGGLE
STATUS
IF YES PRESS ENTER
PRESS ENTER TOUCH PAD
STATUS
PRESS START TO BEGIN CYCLE
PRESS START TOUCH PAD

Figure 3-1. How to Start a Sterile Cycle

- If Options Are Enabled

The display will show screens for all options that are enabled, in the following order:

A. Operator ID Option

If the Operator ID option is enabled, display shows:

(CYCLE INITIATE)
00000

(Underline indicates flashing)

... alternating with ...

ENTER OPER ID
00000

(Underline indicates flashing)

... alternating with ...

PRESS ENTER
00000

(Underline indicates flashing)

Using the alphanumeric touch pads or bar code scanner, enter the appropriate five-digit Operator ID number. Display shows:

(YOUR NAME)
ENTER = CONFIRM

... alternating with ...

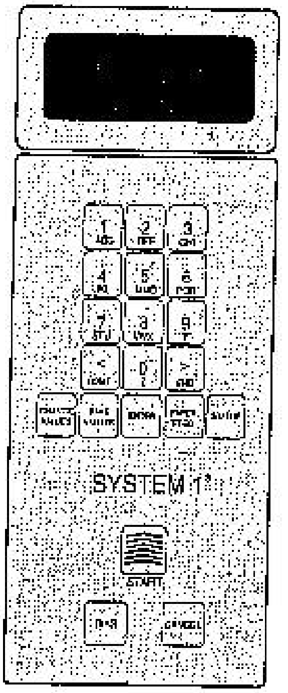
(YOUR NAME)
CANCEL = RETRY

If your name has not been entered into the list of operator names or if the wrong code was entered, display shows:

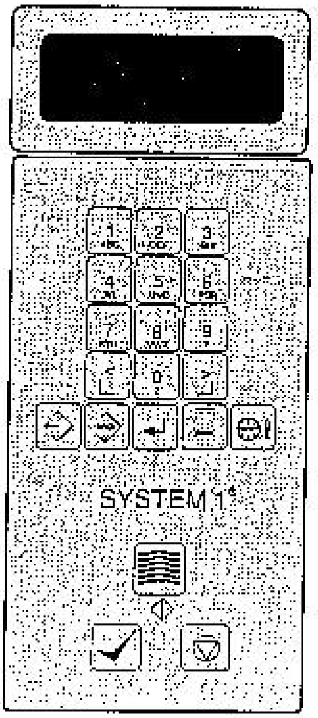
OPERATOR CODE
IS INVALID!

Press the CANCEL touch pad to retry.

When the Operator ID code is entered successfully, control advances to the next option screen.



Touch Pads – Domestic Units



Touch Pads – International Units

B. Patient ID Option

If the Patient ID option is enabled, display shows:

ENTER PATIENT ID
0000000000000000

(Underline indicates flashing)

Using the alphanumeric touch pads or bar code scanner, enter the appropriate 16-digit Patient ID number. Press the ENTER touch pad to confirm the selection.

C. Device ID Option

If the Device ID option is enabled, display shows:

ENTER DEVICE ID
00000

(Underline indicates flashing)

Using the alphanumeric touch pads or bar code scanner, enter the appropriate five-digit Device ID number. Press the ENTER touch pad to confirm the selection.

When the Device ID code is entered, control advances to the next option screen.

D. Procedure ID Option

If the Procedure ID option is enabled, display shows:

ENTER PROCEDURE
00

(Underline indicates flashing)

Using the alphanumeric touch pads or bar code scanner, enter the appropriate two-digit Procedure ID number. Press the ENTER touch pad to confirm the selection.

When the Procedure ID code is entered, control advances to the next option screen.

E. Physician ID Option

If the Physician ID option is enabled, display shows:

ENTER PHYSICIAN
00000

(Underline indicates flashing)

Using the alphanumeric touch pads or bar code scanner, enter the appropriate five-digit Physician ID number. Display will show:

(PHYSICIAN)
ENTER = CONFIRM

... alternating with ...

(PHYSICIAN)
CANCEL = RETRY

Press the ENTER touch pad to confirm the selection, or press CANCEL to retry.

If the physician has not been entered into the list of physician names or if the wrong code was entered, display will show:

PHYSICIAN CODE
IS INVALID!

Press the CANCEL touch pad to retry.

When the Physician ID code is entered successfully, control advances to the next option screen.

F. Informative Option

After the display runs through all the other options, the control advances to the Informative Option screen, if enabled. Display shows:

CHEMICAL STRIP &
DEVICES LOADED?

... alternating with ...

IF YES
PRESS ENTER

Press ENTER touch pad. Display shows:

STERILANT CUP
INSERTED?

... alternating with ...

IF YES
PRESS ENTER

Press ENTER touch pad.

When display shows:

PRESS START
TO BEGIN CYCLE

Press the START touch pad to begin a Sterile cycle.

Step 6. Once the START Touch Pad is Pressed

When the cycle starts, the display shows:

OPERATING
00:00

(Time displayed is counting down.)

The "OPERATING" display will continue until the end of the cycle.

NOTE: If any phase takes longer than expected, the operating timer will stop counting and "OPERATING" will alternate with "ADJUSTING TIME" on the display screen until the cycle advances to the next phase.

Step 7. How to Check the Cycle Status

To check the status of the cycle while the "OPERATING" screen is displayed (while the unit is in-cycle), press the STATUS touch pad. Display will show one of the following screens, depending on what part of the phase the cycle is in when the STATUS touch pad is pressed:

NOTE: The STATUS touch pad cannot be actuated unless the SYSTEM 1 is in-cycle.

- INFLATE SEAL
- WATER PURGE
- WATER FILL
- WARM/MIX
- EXPOSURE/XX: XX
- DRAIN
- RINSE X OF 4
- AIR PURGE
- COMPLETE

The clock timer will continue to count down time remaining in the cycle.

To return to the "OPERATING" screen, press the STATUS touch pad again, or wait for the display to return on its own when it automatically times out in 20 seconds.

Step 8. End of Cycle - Sterile Processing Cycle Complete

- **If Operator ID Option is NOT Enabled**

At the end of a cycle, if the Operator ID option is NOT enabled, display shows:

CYCLE COMPLETE
PRESS CANCEL

Press the CANCEL touch pad. Display shows:

DEFLATE SEAL

A slow beep sounds for approximately 15 seconds as the lid unseals. When the beep stops, display shows:

CYCLE COMPLETE
OPEN LID

SYSTEM 1 is now ready for preparations to run another cycle.

- **If Operator ID Option is Enabled**

NOTE: If this option has been enabled, the Operator ID code must be entered at both the beginning and end of the cycle, in case the person who unloads the machine is different from the person who loaded it.

At the end of the cycle, if the Operator ID option is enabled, display shows:

CYCLE COMPLETE
PRESS CANCEL

Press the CANCEL touch pad, display shows:

CYCLE END
00000

(Underline indicates flashing)

... alternating with ...

ENTER OPER ID
00000

... alternating with ...

PRESS ENTER
00000

Using the alphanumeric touch pads or bar code scanner, enter the appropriate Operator ID number. Then press the ENTER touch pad. If the correct code is entered, display shows:

DEFLATE SEAL

A slow beep sounds for approximately 15 seconds as the lid unseals. When the beep stops, display shows:

CYCLE COMPLETE
OPEN LID

SYSTEM 1 is now ready for preparations to run another cycle.

- **If Informative Option** is Enabled

If the informative option is enabled, the display shows the following at the end of a cycle:

CYCLE COMPLETE
PRESS CANCEL

Press the CANCEL touch pad. Display shows:

DEFLATE SEAL

A slow beep sounds for approximately 15 seconds as the lid unseals. When the beep stops, display shows:

CHECK CHEMICAL
STRIP

... alternating with ...

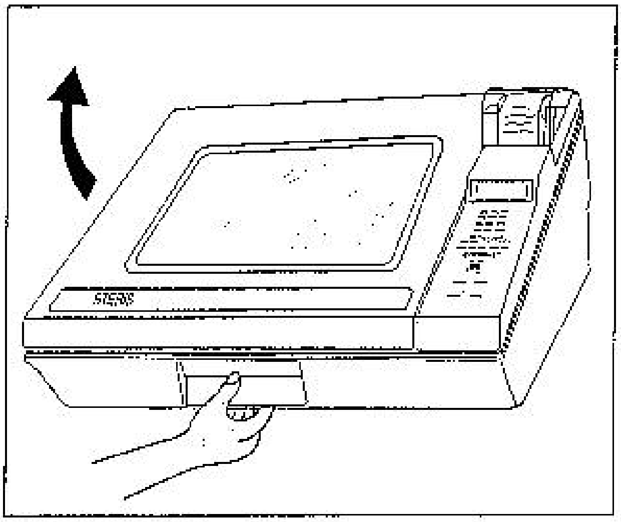
VERIFY
CUP EMPTY

... until lid is opened.

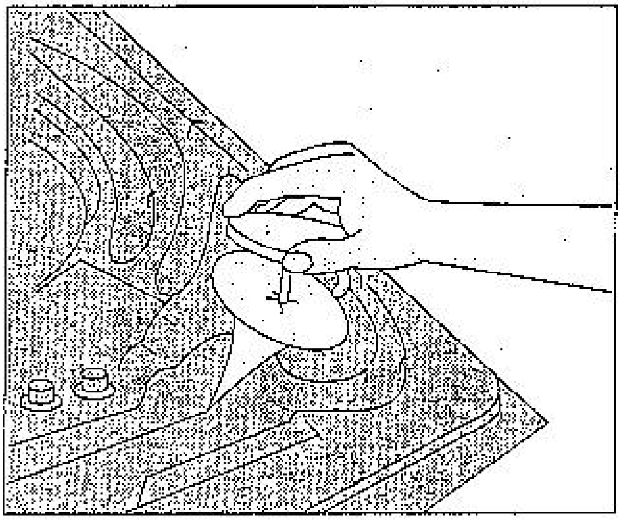
SYSTEM 1 is now ready for preparations to run another cycle.

Step 9. Lift Handle, Open Lid (as shown).

The lid may be opened as soon as the seal deflates.



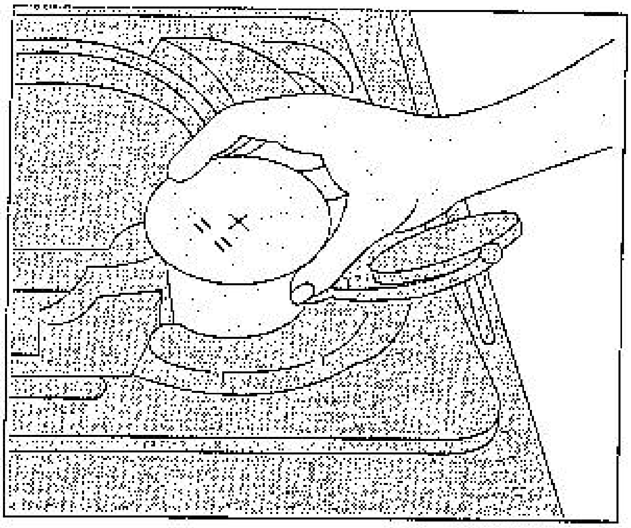
Step 10. Remove Aspirator Probe From Sterilant Container (as shown).



Step 11. Remove Empty Sterilant Container and Discard.

WARNING: Always verify that the sterilant container is empty at the end of the cycle.

If the container is not empty, then the load cannot be considered sterile. REFER TO SECTION 3.7 OF THIS MANUAL FOR DISPOSAL INSTRUCTIONS. CALL STERIS.



Step 12. Remove Processed Items.

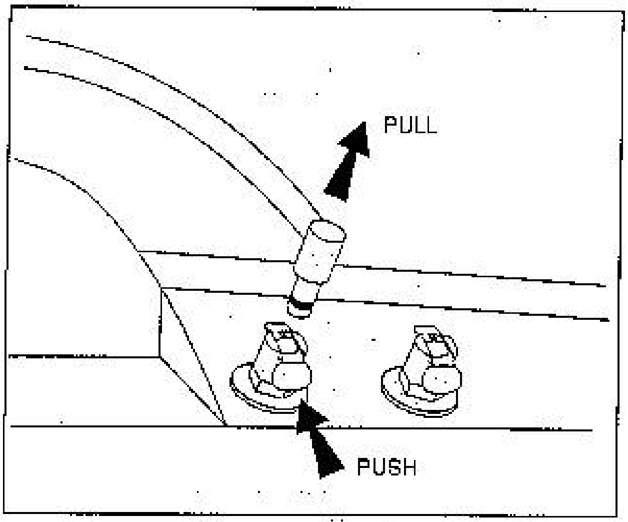
- Processing Tray/Container

Follow departmental procedures for removal and transportation to the sterile field.

- Flexible Processing Tray

Disconnect all tubing from left and right fluid ports. Remove all tubing and adapters from the device.

Follow departmental procedures for removal and transportation to the sterile field.



3.3 CANCELLED CYCLE: MODEL 99A1 AND 99A2 UNITS

WARNING: Devices are not sterilized and/or adequately rinsed when a sterile processing cycle is cancelled.

The CANCEL function will be initiated automatically by the SYSTEM 1 if one or more of the parameters for sterilization have not been achieved or maintained. A cycle may also be cancelled by the operator.

In either case, whenever CANCEL occurs, the devices will NOT be sterilized and/or adequately rinsed. The reason for cancellation and the stage the cycle is in at the time of cancellation must be taken into consideration when developing departmental policies and procedures for the disposition of the devices. Minimum requirements should include adequate rinsing of the devices and alternative processing procedures.

Step 1. Press CANCEL Touch Pad.

To cancel a cycle after it has been initiated, press the CANCEL touch pad twice within eight seconds, while the tone is still beeping.

NOTE: An unit -initiated cycle cancellation is signalled by an alarm tone.

In either case, the display shows:

ALERT
CANCELLING CYCLE

... alternating with ...

ALERT
SEE PRINTOUT

These messages display for approximately 40 seconds, then a rapid beep sounds for ten seconds, and the display shows:

ALERT
CYCLE CANCELLED

... alternating with ...

SEE PRINTOUT
PRESS CANCEL

Step 2. Verify that Fluid Has Drained From the Chamber.

CAUTION: If fluid remains in the chamber, call STERIS.

Look through the unit window into the chamber to verify that the fluid has drained from the chamber.

Step 3. If Fluid Has Drained, Press the CANCEL Touch Pad.

Press the CANCEL touch pad. Display shows:

DEFLATE SEAL

... for approximately 15 seconds. When the seal is deflated, display shows:

WARNING
NOT STERILE

... alternating with ...

DISPOSE OF CUP
USE CAUTION

Step 4. Lift Handle–Open Lid.

The lid may be opened as soon as the seal deflates. Display shows:

READY
(TIME & DATE)

Or, if any option is enabled, the display shows the first option enabled, for example:

ENTER OPER ID
00000

Follow the prompts on the display.

Step 5. Dispose of Sterilant.

REFER TO SECTION 3.7 OF THIS MANUAL FOR STERILANT DISPOSAL INSTRUCTIONS.

Step 6. Remove the Device.

Remove the device and follow your departmental policy/procedure for disposition.

Step 7. If Cancellation was Initiated by the Unit, Troubleshoot the Problem.

Check the printout message. Refer to "TROUBLESHOOTING" located in Section 8 of your Operator Manual. Find the problem and follow the instructions.

3.4 CONTROL VALUE PROGRAMMING

SYSTEM 1 is shipped with factory-set cycles, cycle values, and control values programmed into the control. These are the values to which the control will default should a battery or battery-powered memory failure ever occur.

Some preset values can be changed to tailor the SYSTEM 1 to the operating environment in which it has been placed. To change any of these values, refer to the Change Values Procedure later in this section.

NOTE: If a battery/memory failure should occur, operator-set values would be lost. The factory-set control values would then appear on the display when the power is restored and the unit switched on.

3.4.1 Change Machine Setup

Setup options are used to change the way the SYSTEM 1 operates in a general way. When the supervisor sets an Access Code, the Access Code will "lock out" all selections except Language, Time, and Date (see "Access Code," later in this section, for more information on this feature). All setup options are accessed from the CHANGE VALUES touch pad.

Setup options that can be adjusted are summarized below. These options appear on the display in the same order as listed below. Each option is detailed in the pages that follow.

NOTE: Cycle values (time, temperature) cannot be adjusted.

3.4.2 Change Values Selections

- **Language** – This setting allows selection of a preprogrammed language for displays and printouts. Default is for displays and printouts to be in the language of the destination country to which the unit is shipped. Selections are English, Spanish, French, German and Italian.
- **Time Set** – This setting allows adjustment of the control to display and print the current time of day (see TIME FORMAT for setting the time format).
- **Date Set** – This setting allows adjustment of the control to display and print the current date (see DATE FORMAT for setting the date sequence).
- **Access Code** – When enabled, this option locks out operator access to all Change Values selections except Language, Time and Date. The Access Code limits access to locked-out options and control settings, making them unavailable for change by an operator without first entering the Access Code. Default is for NO Access Code.
- **Operator ID** – This option selection assigns a five-digit number to an operator-selected user name that will appear on cycle printouts. Default is for NO Operator ID number.
- **Patient ID** – This option selection assigns a 16-digit numeric code to specific patients that will appear on cycle printouts. Default is for NO Patient ID.
- **Device ID** – This option selection assigns a five-digit numeric code linked to specific devices that will appear on cycle printouts. Default is for NO Device ID.
- **Procedure ID** – This option selection assigns a two-digit numeric code linked to specific procedures that will appear on cycle printouts. Default is for NO Procedure ID.
- **Physician ID** – This option selection assigns a five-digit number to an operator-selected physician's name that will appear on cycle printouts. Default is for NO Physician ID.
- **Inform Option** – This option selection for Informative Options enables a series of cycle-related questions to appear on the display, for the operator to answer, before beginning a cycle. Default is for NO Informative Option.
- **Auto Dupl Print** – This setting allows the SYSTEM 1 to automatically furnish a duplicate printout at the end of each cycle. Printout will note — DUPLICATE PRINT — and complete printout of cycle data will be furnished. Default is for NO automatic duplicate printout.
- **End-of-Cycle Tone** – This selection is for an end-of-cycle tone to sound at the completion of each cycle. Tone can be set ON (YES) or OFF (NO). Default is YES for end-of-cycle tone.
- **Time Format** – This setting establishes the sequence for time displays and printouts in either AM/PM or 24-hour format. Default is AM/PM. (See TIME SET for setting current time.)
- **Date Format** – This setting establishes the sequence for date displays and printouts. Default is MDY (Month/Day/Year) sequence. Options are DMY (Day/Month/Year), YMD (Year/Month/Day) (see DATE SET for setting the current date).
- **Filter Type Select** – This setting allows selection of the type of water filter to be installed on the unit. Selections are: 1502, 1505, 1525, and USER DEFINE. "User Define" allows the operator to manually select the pressure drop for any additional STERIS supplied SYSTEM 1 filters.

3.4.3 Change Values Procedure

To change display/printout values, proceed as follows.

(If lid is closed, and no options are enabled, display will show):

READY
(TIME & DATE)

... alternating with ...

PRESS START
TO BEGIN CYCLE

-OR-

(If lid is open, and no options are enabled, display will show):

READY
(TIME & DATE)

-OR-

(If lid is open or closed, and any of the options are enabled, display will show one of the option entry screens, for example):

ENTER OPER ID
00000

Follow the prompts on the display screen. When the CHANGE VALUES touch pad is pressed, the display shows the first Change Values selection that can be changed:

NOTE: At any point of the Change Values procedure, pressing the SAVE VALUES touch pad will provide a printout of the current settings, including any changes made.

1. Language

LANGUAGE
ENGLISH

(The underlined selection is flashing.)

Press the left arrow (<) or right arrow (>) touch pad to select the language for displays/printouts. Default language depends on the destination country to which the unit is shipped. Selections are English, Spanish, French, German and Italian.

After making a selection, press the CHANGE VALUES touch pad to save the changes made to that point and advance to the next screen– or– press the SAVE VALUES touch pad to save all changes made to that point and advance to the end of the Change Values procedure.

If CHANGE VALUES is pressed, the display advances to the next selection that can be changed.

2. Time Set

TIME SET
09:42AM

(The underlined selection is flashing.)

Press the left arrow (<) or right arrow (>) touch pad to move the cursor for each digit, and press the numbered touch pads to set the current time of day for displays/printouts. Then press the ENTER touch pad to select AM or PM.

NOTE: See TIME FORMAT for instructions on changing AM/PM to 24 Hour.

Press the CHANGE VALUES touch pad to save the changes made to this point and advance to the next screen, or press the SAVE VALUES touch pad to save all changes made and advance to the end of the Change Values procedure.

If CHANGE VALUES is pressed, the display advances to the next selection that can be changed.

3. Date Set

DATE SET
07/08/99

(The underlined selection is flashing.)

Press the left arrow (<) or right arrow (>) touch pad to move the cursor for each digit, and the numbered touch pads to set the current date for displays/printouts.

NOTE: See DATE FORMAT for instructions on changing date sequence from MDY to DMY or YMD.

Press the CHANGE VALUES touch pad to save the changes made to this point and advance to the next screen, or press the SAVE VALUES touch pad to save all changes made and advance to the end of the Change Values procedure.

If CHANGE VALUES is pressed, the display advances to the next selection that can be changed.

4. Setting an Access Code

ACCESS CODE
YES NO

(The underlined selection/default is flashing.)

To set an Access Code, first press the left arrow (<) or right arrow (>) touch pad to move the cursor from NO to YES. Display shows:

ENTER ACCESS CODE
0000

(The underlined digit is flashing.)

Use the numbered touch pads to set a four-digit Access Code. Press the left arrow (<) or right arrow (>) touch pad to move the cursor to each digit. Display shows:

ACCESS CODE SET
1234*

**Example*

Press the CHANGE VALUES touch pad to save the changes made to this point and advance to the next screen, or press the SAVE VALUES touch pad to save all changes made and advance to the end of the Change Values procedure.

If CHANGE VALUES is pressed, the display advances to the next selection that can be changed.

5. Operator ID Option

Refer to Figure 3-2.

This option allows the operator to input five-digit numeric codes that correspond to specific names of operators who will be using the SYSTEM 1. Display shows:

OPERATOR ID?
YES NO

(The underlined selection/default is flashing.)

To enable the Operator ID option, press the left arrow (<) or right arrow (>) touch pad to move the cursor from NO to YES. If YES is selected, display shows:

PRINT OPER LIST?
YES NO

Select YES to print the current list of operators. Select either choice to advance to the next screen:

EDIT OPER LIST?
YES NO

Select "YES," then press the CHANGE VALUES touch pad. Display shows:

OPER LIST EDIT
ADD REMOVE

- To Add Operator Name(s)

To add a name, press the CHANGE VALUES touch pad. Display shows:

OPER EDIT LIST
NUMBER=XXXXX

Use the numeric touch pads to enter an Operator ID number. Then press the CHANGE VALUES touch pad. Display shows:

NAME FOR XXXXX
(CURSOR INDICATES WHERE TO ENTER NAME)

NOTE: (Refer to the control panel[s] shown at the beginning of this section.) When this display is shown, the numeric touch pads will automatically change to their letter values. For example, use key "1" for letters A, B, C; key "2" for letters D, E, F, etc.

The flashing cursor indicates where to enter the name. Names up to 15 letters long may be entered. After entering the name, press the CHANGE VALUES touch pad:

- **If the name is already in the list, display shows:**

OPERATOR XXXXX
ALREADY EXISTS!

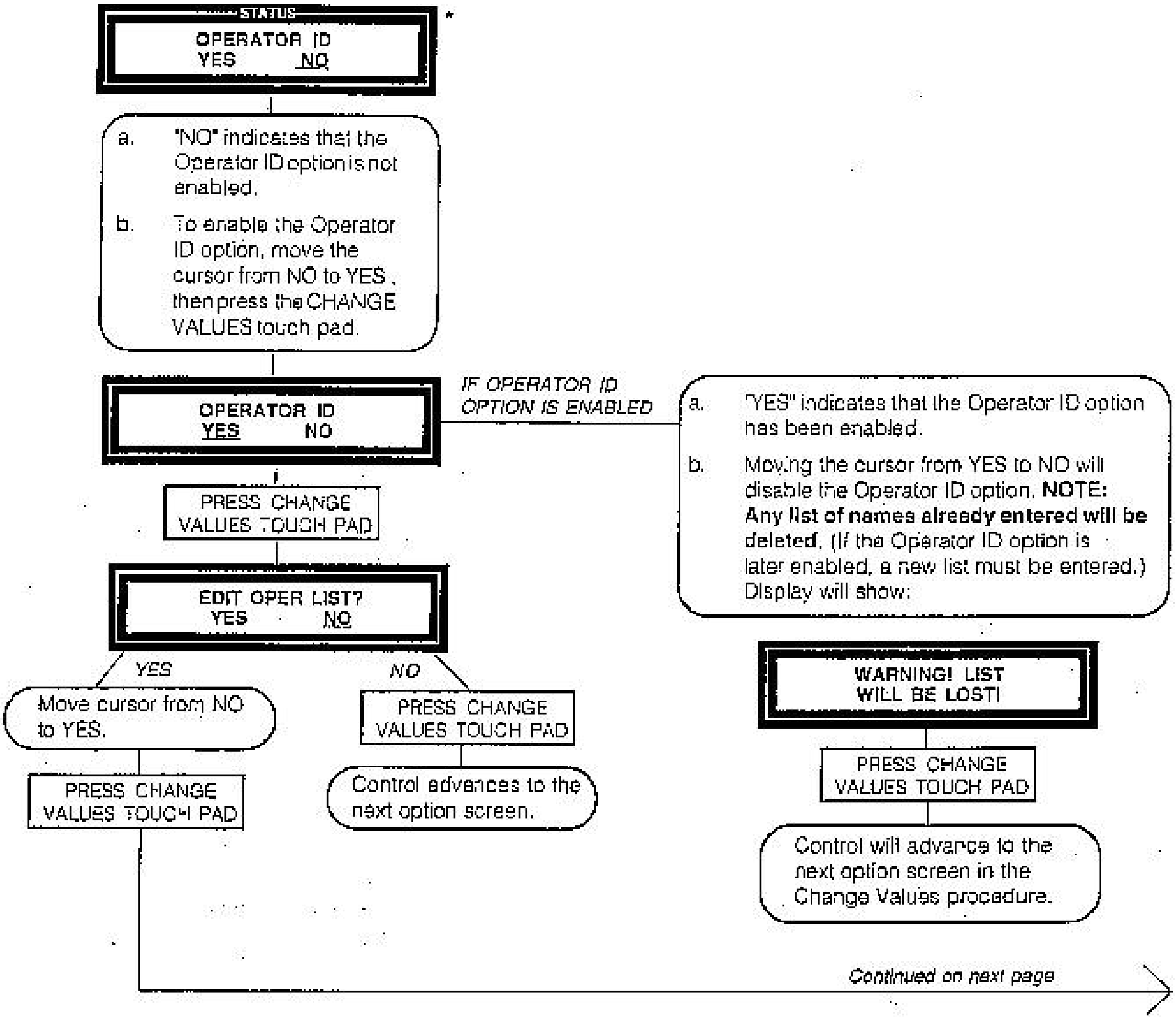
If this happens, the screen displays the message until the CHANGE VALUES touch pad is pressed, then returns to this display:

OPER LIST EDIT
ADD REMOVE

- **If the name is not already in the list, display shows:**

OPERATOR XXXXX
ADDED TO LIST

Factory default is:


STATUS
OPERATOR ID
YES NO
*
OPERATOR ID
YES NO
IF OPERATOR ID OPTION IS ENABLED
PRESS CHANGE VALUES TOUCH PAD
EDIT OPER LIST?
YES NO
YES
NO
PRESS CHANGE VALUES TOUCH PAD
PRESS CHANGE VALUES TOUCH PAD
WARNING! LIST WILL BE LOST!
PRESS CHANGE VALUES TOUCH PAD
Continued on next page

a. "NO" indicates that the Operator ID option is not enabled.

b. To enable the Operator ID option, move the cursor from NO to YES, then press the CHANGE VALUES touch pad.

a. "YES" indicates that the Operator ID option has been enabled.

b. Moving the cursor from YES to NO will disable the Operator ID option. **NOTE: Any list of names already entered will be deleted.** (If the Operator ID option is later enabled, a new list must be entered.) Display will show:

Move cursor from NO to YES.

Control advances to the next option screen.

Control will advance to the next option screen in the Change Values procedure.

**This sequence of screens can also be used as a guide to add or remove a Physician ID Name. Substitute "Physician" for "Operator" in the instructions.*

Figure 3-2. How to Add/Remove Operator Names

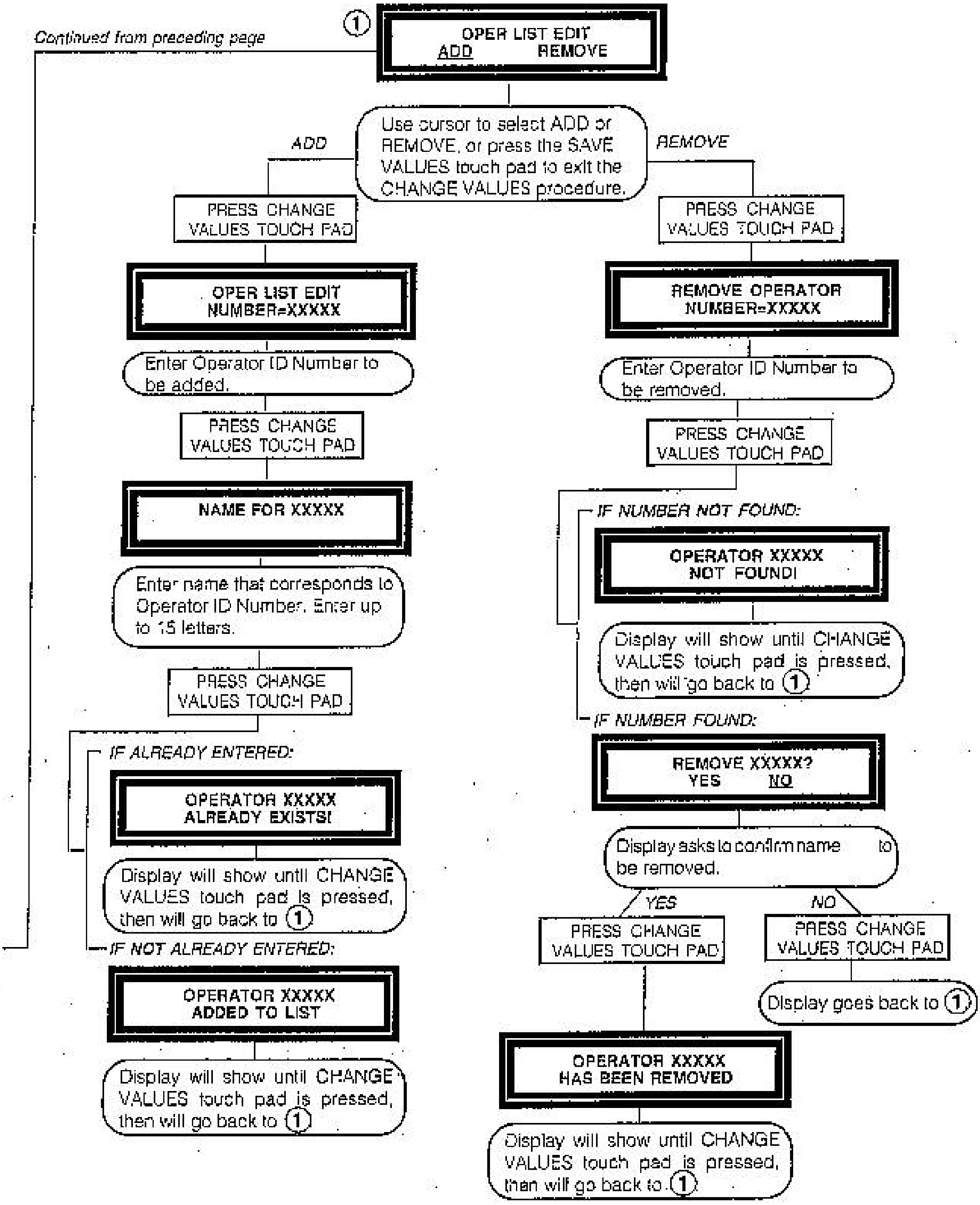

Continued from preceding page
①
OPER LIST EDIT
ADD REMOVE
Use cursor to select ADD or REMOVE, or press the SAVE VALUES touch pad to exit the CHANGE VALUES procedure.
ADD
REMOVE
PRESS CHANGE VALUES TOUCH PAD
OPER LIST EDIT NUMBER=XXXXX
Enter Operator ID Number to be added.
PRESS CHANGE VALUES TOUCH PAD
NAME FOR XXXXX
Enter name that corresponds to Operator ID Number. Enter up to 15 letters.
PRESS CHANGE VALUES TOUCH PAD
IF ALREADY ENTERED:
OPERATOR XXXXX ALREADY EXISTS!
Display will show until CHANGE VALUES touch pad is pressed, then will go back to ①
IF NOT ALREADY ENTERED:
OPERATOR XXXXX ADDED TO LIST
Display will show until CHANGE VALUES touch pad is pressed, then will go back to ①
PRESS CHANGE VALUES TOUCH PAD
REMOVE OPERATOR NUMBER=XXXXX
Enter Operator ID Number to be removed.
PRESS CHANGE VALUES TOUCH PAD
IF NUMBER NOT FOUND:
OPERATOR XXXXX NOT FOUND!
Display will show until CHANGE VALUES touch pad is pressed, then will go back to ①
IF NUMBER FOUND:
REMOVE XXXXX? YES NO
Display asks to confirm name to be removed.
YES
NO
PRESS CHANGE VALUES TOUCH PAD
PRESS CHANGE VALUES TOUCH PAD
Display goes back to ①
OPERATOR XXXXX HAS BEEN REMOVED
Display will show until CHANGE VALUES touch pad is pressed, then will go back to ①

Figure 3-2. How to Add/Remove Operator Names (Continued)

The screen will display the message until CHANGE VALUES touch pad is pressed to confirm that the name was added, then will go back to this display (to add more names, if necessary):

OPER LIST EDIT
ADD REMOVE

Press the CHANGE VALUES touch pad to save the changes made to this point and advance to the next screen, or press the SAVE VALUES touch pad to save all changes made, print a revised Operator list, and advance to the end of the Change Values procedure.

If CHANGE VALUES is pressed, the display advances to the next selection that can be changed.

- **To Remove Operator Name(s)**

To remove a name, when the display shows:

OPER LIST EDIT
ADD REMOVE

(The underlined selection/default is flashing.)

Press the left arrow (<) or right arrow (>) touch pad to move the cursor from ADD to REMOVE, then press the CHANGE VALUES touch pad. Display shows:

REMOVE OPERATOR
NUMBER=XXXXX

Use the numeric touch pads to enter an Operator ID number. Then press the CHANGE VALUES touch pad.

- If the number entered is NOT found, display shows:

OPERATOR XXXXX
NOT FOUND!

If this happens, the screen will display the message until CHANGE VALUES touch pad is pressed, then returns to this display:

OPER LIST EDIT
ADD REMOVE

- If the number is found, display shows:

REMOVE XXXXX?
YES NO

Press the left arrow (<) or right arrow (>) touch pad to move the cursor to YES or NO, then press the CHANGE VALUES touch pad.

- If NO is selected, the screen returns to this display:

OPER LIST EDIT
ADD REMOVE

- If YES is selected, display shows:

OPERATOR XXXXX
HAS BEEN REMOVED

The screen displays the message until CHANGE VALUES touch pad is pressed to confirm that the name was removed, then returns to this display (to remove more names, if necessary):

OPER LIST EDIT
ADD REMOVE

Press the CHANGE VALUES touch pad to save the changes made to this point and advance to the next screen, or press the SAVE VALUES touch pad to save all changes made, print a revised operator list, and advance to the end of the Change Values procedure.

- **To turn off the Operator ID Option**

When the Operator ID is enabled, display will show:

OPERATOR ID
YES NO

(The underlined selection/default is flashing.)

To turn off the option, press the left arrow (<) or right arrow (>) touch pad to move the cursor from YES to NO. Display shows:

WARNING! LIST
WILL BE LOST!

IMPORTANT: This screen tells the operator that the current list of names will be deleted, and that operator names must be re-entered the next time the Operator ID option is enabled.

Press the CHANGE VALUES touch pad to save the changes made to this point and advance to the next screen, or press the SAVE VALUES touch pad to save all changes made and advance to the end of the Change Values procedure.

If CHANGE VALUES is pressed, the display advances to the next selection that can be changed.

6. Patient ID Option

PATIENT ID
YES NO

(The underlined selection/default is flashing.)

This option allows the operator to input 16-digit numeric codes that correspond to specific names of patients associated with the use of devices processed by the SYSTEM 1.

To enable the Patient ID option, press the left arrow (<) or right arrow (>) touch pad to move the cursor from NO to YES.

Press the CHANGE VALUES touch pad to save the changes made to this point and advance to the next screen, or press the SAVE VALUES touch pad to save all changes made and advance to the end of the Change Values procedure.

If CHANGE VALUES is pressed, the display advances to the next selection that can be changed.

7. Device ID Option

DEVICE ID
YES NO

(The underlined selection/default is flashing.)

This options allows the operator to input five-digit numeric codes to identify specific devices that will be processed in the SYSTEM 1.

To enable the Device ID option, press the left arrow (<) or right arrow (>) touch pad to move the cursor from NO to YES.

Press the CHANGE VALUES touch pad to save the changes made to this point and advance to the next screen, or press the SAVE VALUES touch pad to save all changes made and advance to the end of the Change Values procedure.

If CHANGE VALUES is pressed, the display advances to the next selection that can be changed.

8. Procedure ID Option

PROCEDURE ID
YES NO

(The underlined selection/default is flashing.)

This option allows the operator to input two-digit numeric codes to identify specific procedure names that will be keyed to the customer's procedures.

To enable the Procedure ID option, press the left arrow (<) or right arrow (>) touch pad to move the cursor from NO to YES.

Press the CHANGE VALUES touch pad to save the changes made to this point and advance to the next screen, or press the SAVE VALUES touch pad to save all changes made and advance to the end of the Change Values procedure.

If CHANGE VALUES is pressed, the display advances to the next selection that can be changed.

9. Physician ID Option

PHYSICIAN ID
YES NO

(The underlined selection/default is flashing.)

This option allows the operator to input five-digit numeric codes that correspond to specific names of physicians who will be using devices processed by the SYSTEM 1.

To enable the Physician ID option, press the left arrow (<) or right arrow (>) touch pad to move the cursor from NO to YES.

If YES is selected, the display will show:

PRINT PHYS LIST?
YES NO

(The underlined selection is flashing.)

Select YES to generate the current list of physicians. Select either choice to advance to the next screen:

EDIT PHYS LIST?
YES NO

NOTE: To add/remove names to/from the list of physicians for this option, follow the flow chart in Figure 3-2, along with the sequence of steps for adding or removing operator names. Substitute "Physician" for "Operator" in the instructions.

Press the CHANGE VALUES touch pad to save the changes made to this point and advance to the next screen, or press the SAVE VALUES touch pad to save all changes made, print a revised physician list and advance to the end of the Change Values procedure.

If CHANGE VALUES is pressed, the display advances to the next selection that can be changed.

10. Inform Option

INFORM OPTION
YES NO

(The underlined selection/default is flashing.)

This option causes the control to run a series of cycle-related questions before a cycle can be started and at the end of a cycle.

To enable the Inform Option, press the left arrow (<) or right arrow (>) touch pad to move the cursor from NO to YES.

Press the CHANGE VALUES touch pad to save the changes made to this point and advance to the next screen, or press the SAVE VALUES touch pad to save all changes made and advance to the end of the Change Values procedure.

If CHANGE VALUES is pressed, the display advances to the next selection that can be changed.

11. Auto Duplicate Print

AUTO DUPLICATE PRINT
YES NO

(The underlined selection/default is flashing.)

To set the control to automatically print a duplicate printout, press the left arrow (<) or right arrow (>) touch pad to move the cursor from NO to YES.

Press the CHANGE VALUES touch pad to save the changes made to this point and advance to the next screen, or press the SAVE VALUES touch pad to save all changes made and advance to the end of the Change Values procedure.

If CHANGE VALUES was pressed, the display advances to the next selection that can be changed.

12. End-of-Cycle Tone

END OF CYCLE TONE
YES NO

(The underlined default is flashing.)

To disable the tone sound signal at the end of each cycle, press the left arrow (<) or right arrow (>) touch pad to move the cursor from YES to NO.

Press the CHANGE VALUES touch pad to save the changes made to this point and advance to the next screen, or press the SAVE VALUES touch pad to save all changes made and advance to the end of the Change Values procedure.

If CHANGE VALUES is pressed, the display advances to the next selection that can be changed.

13. Time Format

TIME FORMAT
AM/PM 24 HOUR

(The underlined selection/default is flashing.)

To set the control to automatically display and print cycle times in 24-hour (military) format, press the left arrow (<) or right arrow (>) touch pad to move the cursor from AM/PM to 24 HOUR.

NOTE: See TIME SET for instructions on setting the current time.

Press the CHANGE VALUES touch pad to save the changes made to this point and advance to the next screen, or press the SAVE VALUES touch pad to save all changes made and advance to the end of the Change Values procedure.

If CHANGE VALUES was pressed, the display advances to the next selection that can be changed.

14. Date Format

DATE FORMAT
MDY DMY YMD

(The underlined selection/default is flashing.)

The default setting is MDY (month/day/year) sequence. To set the control to automatically display and print dates in DMY (day/month/year) or YMD (year/month/day) sequence, press the left arrow (<) or right arrow (>) touch pad to move the cursor from MDY to the appropriate Date Format selection.

NOTE: See DATE FORMAT for instructions on setting the current date.

Press the CHANGE VALUES touch pad to save the changes made to this point and advance to the next screen, or press the SAVE VALUES touch pad to save all changes made and advance to the end of the Change Values procedure.

If CHANGE VALUES is pressed, the display advances to the next selection that can be changed.

15. Filter Type Select

FILTER TYPE
1525

(The underlined default is flashing.)

Press the left arrow (<) or right arrow (>) touch pad to scroll through the selections: 1502, 1505, 1525, USER DEFINE. These selections correspond to the different water filter types for the SYSTEM 1.

If a filter other than A1502, A1505, or A1525 is supplied, there will be instructions with the filter as to the data that needs to be entered in "USER DEFINE."

If USER DEFINE is selected, display shows:

FILTER TYPE
USER DEFINE = X.XX

(Underline indicates flashing.)

From this screen, the operator may use the numeric touch pads to enter the pressure drop for a given filter type.

Press the CHANGE VALUES touch pad to save the changes made to this point and advance to the next screen, or press the SAVE VALUES touch pad to save all changes made and advance to the end of the Change Values procedure.

Filter Type is the last option in the Change Values procedure. When CHANGE VALUES or SAVE VALUES touch pad is pressed, the display will briefly show:

*** UPDATING ***
*** MEMORY ***

The display reverts to one of the following screens:

1. If lid is closed, and no options are enabled, display shows:

READY
(TIME & DATE)

... alternating with ...

PRESS START
TO BEGIN CYCLE

If so, press the START touch pad.

-OR-

2. If lid is open, and no options are enabled, display shows:

READY
(TIME & DATE)

Close the lid. Then press the START touch pad when prompted.

-OR-

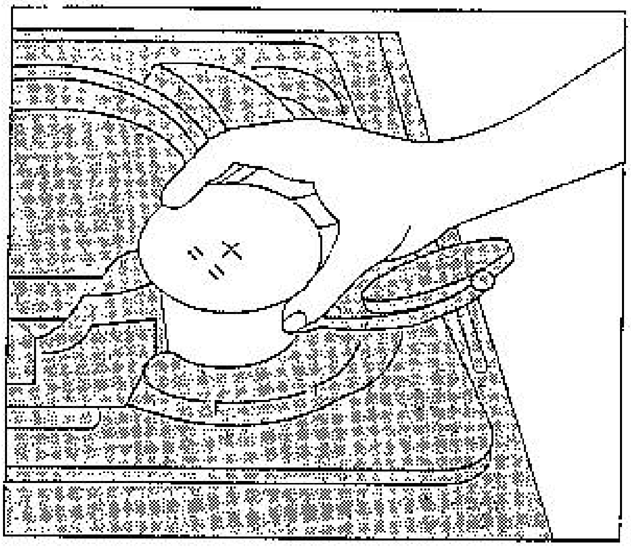
3. If any of the options are enabled (lid open or closed), display will show one of the option entry screens, for example:

OPERATOR ID
00000

If so, enter the appropriate information.

Follow the prompts on the display screen. The SYSTEM 1 is ready to begin a cycle.

3.5 OPERATING PROCEDURE FOR MODEL 89A1, 90B1, 90A1 AND 90A2 UNITS



DANGER: Risk of explosion if used in the presence of flammable anesthetics.

WARNING: Prior to use, thoroughly read and be familiar with the SYSTEM 1 Operator Manual and all additional warning and caution statements in the appendices. The SYSTEM 1 unit should be operated only by trained personnel in the manner described in this manual.

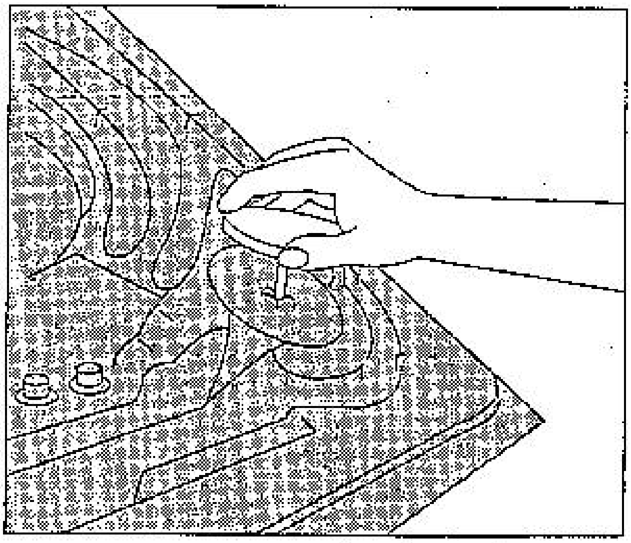
NOTE: Operating procedures for Model 99A1 and 99A2 are found in Section 3.2.

Step 1. Prepare and Load Items.

WARNING: Failure to thoroughly clean devices prior to processing may result in an ineffective sterile process.

WARNING: Use the Quick Connect adapter specifically designed for the device being processed.

Prepare and load items to be processed as described in this manual and/or according to the appropriate Quick-Connect instructions.



Step 2. Add STERIS 20 Sterilant Concentrate.

WARNING: Do not use Sterilant Concentrate after the expiration date indicated on the label.

WARNING: Do not substitute any other product for STERIS 20™ Sterilant Concentrate.

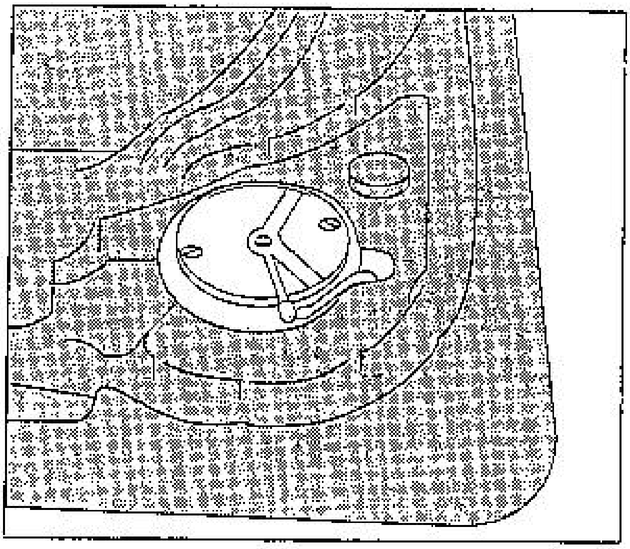
The sterilant compartment is located in the lower right-hand corner of the processing tray.

Push sterilant container down until the lid is flush with the tray.

Step 3. Insert Aspirator Probe.

Line up the tip of the aspirator probe over the crosscuts located in the center of the sterilant lid.

Insert the probe in a downward motion until the top of the aspirator is resting on the lid of the sterilant.



Aspirator probe assembly in the correct position

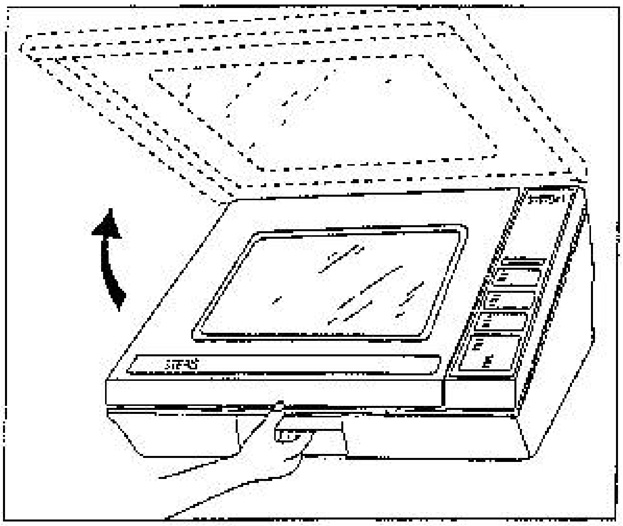
The illustration to the right shows the correct position of the aspirator probe assembly with the connected flexible tube in the 5 o'clock position when the probe is placed into the sterilant.

BE MINDFUL AND OBSERVANT – TUBING MUST NOT BE KINKED AT ANY POINT.

Step 4. Close Lid.

If resistance is met, STOP, inspect positioning of the processing tray/container, device and aspirator assembly.

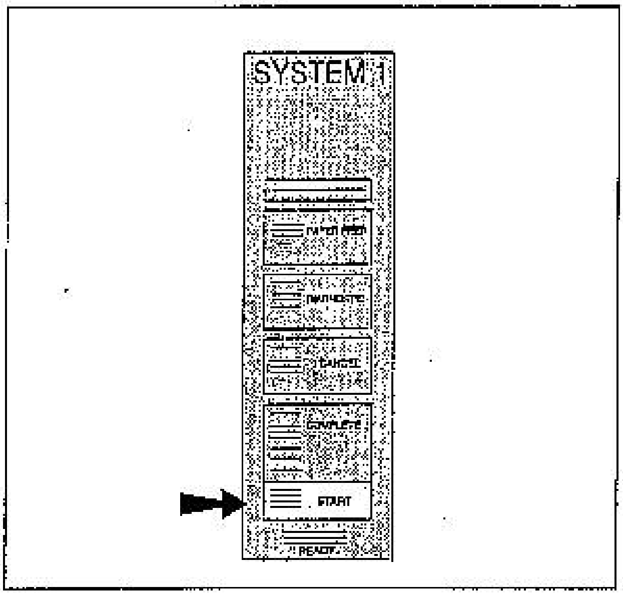
⚠ **CAUTION: Do not force lid to close.**


STERIS
SYSTEM 1

Step 5. Press START.

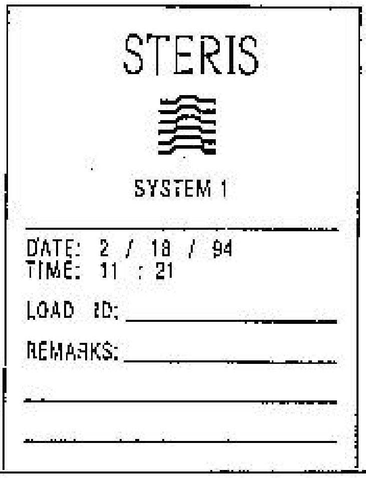
Light 1–ON

READY light–OFF


SYSTEM 1
PAPER FEED
DIAGNOSTIC
CANCEL
COMPLETE
START
READY

The printer will start.

The printout will advance to show STERIS logo, date, time, load ID, and space for remarks.



STERIS

SYSTEM 1

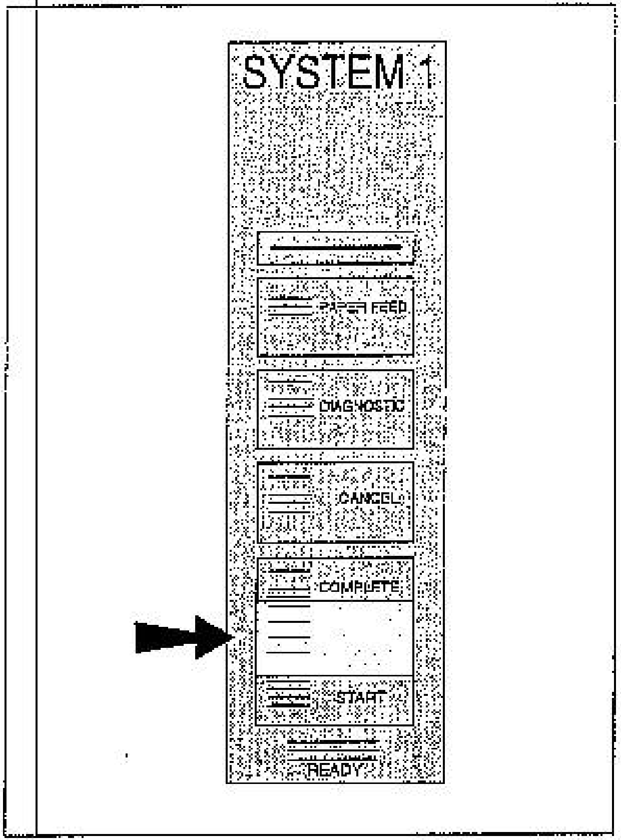
DATE: 2 / 18 / 94
TIME: 11 : 21

LOAD ID: ____________

REMARKS: ____________

Step 6. Sterile Processing Cycle.

The total cycle time is generally less than 30 minutes. Cycle time is dependent on temperature and pressure of incoming water and filter cleanliness. As the cycle advances, lights 2 through 4 will sequentially be turned on, indicating the progress of the cycle.


SYSTEM 1
PAPER FEED
DIAGNOSTIC
CANCEL
COMPLETE
START
READY

Step 7. Sterile Processing Cycle Complete.

Audible tone - five 1-second beeps.

Lights 1 through 4 - OFF

COMPLETE light - ON

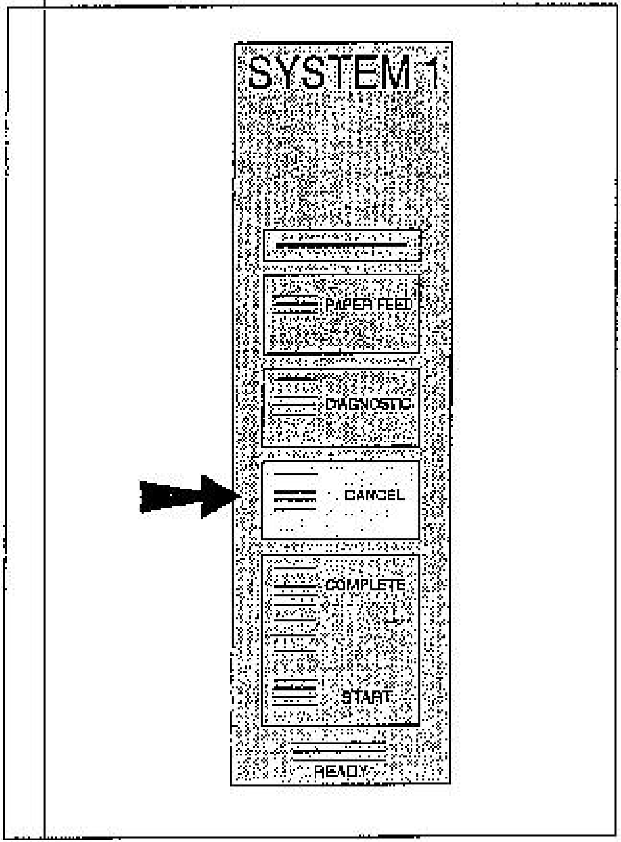
The printer begins printing the cycle information when the COMPLETE light comes on. It finishes printing all but the chamber-opened time a few seconds after the beeping stops.

The CANCEL button may be pressed as soon as the COMPLETE light is on. The beeping will stop, but the printer will continue to print.

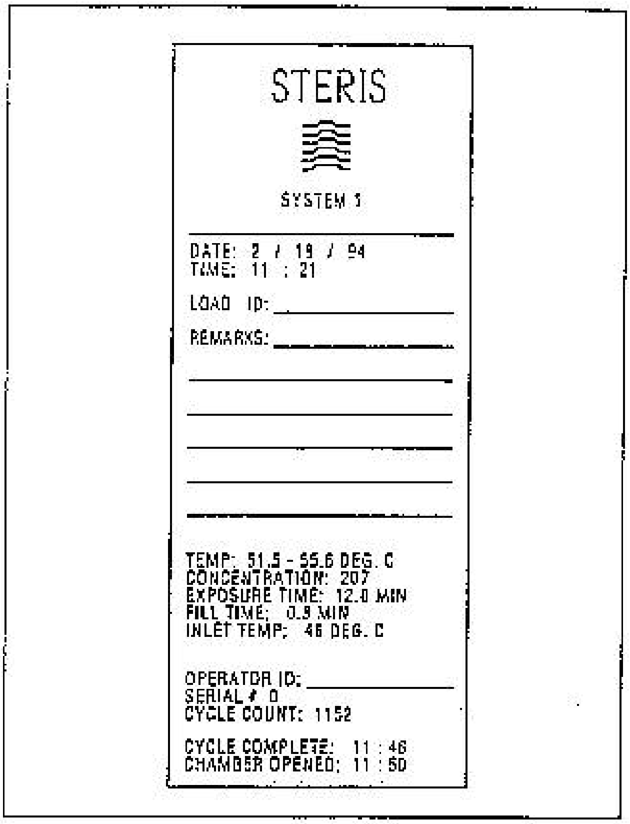
Step 8. Press CANCEL.

Inflatable seal will deflate.

The printer will print the chamber-opened time and advance to show the completed cycle record.


SYSTEM 1
PAPER FEED
DIAGNOSTIC
CANCEL
COMPLETE
START
READY

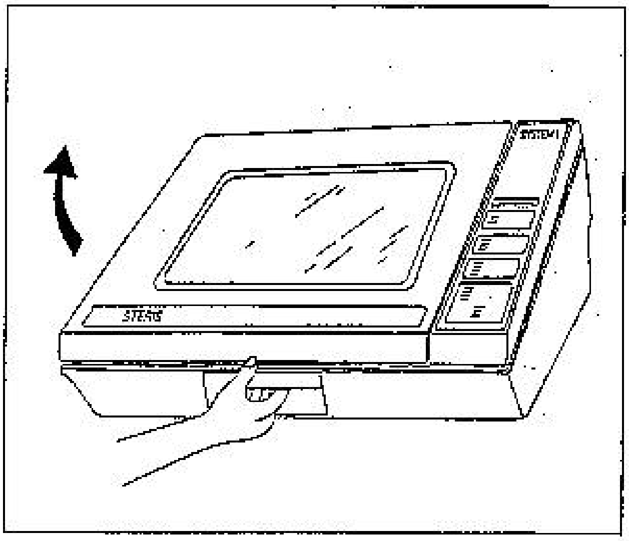
READY light will come on. COMPLETE light will turn off.



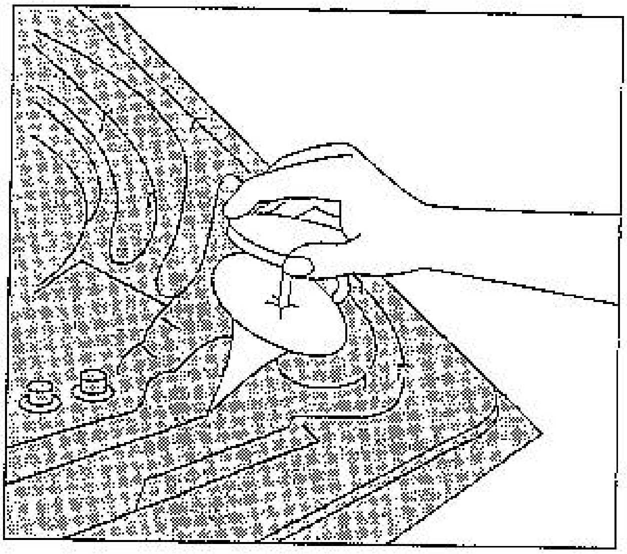
```
STERIS

SYSTEM 1

DATE:  2 / 19 / 94
TIME:  11 : 21

LOAD  ID: ____________________

REMARKS: _____________________
______________________________
______________________________
______________________________
______________________________
______________________________

TEMP:  51.5 - 55.6 DEG. C
CONCENTRATION:  207
EXPOSURE TIME:  12.0 MIN
FILL TIME:   0.9 MIN
INLET TEMP:   46 DEG. C

OPERATOR ID: _________________
SERIAL #  0
CYCLE COUNT:  1152

CYCLE COMPLETE:   11 : 46
CHAMBER OPENED:   11 : 50
```

Step 9. **Lift Handle, Open Lid.**

The lid may be opened as soon as the seal deflates.



Step 10. Remove Aspirator Probe From Sterilant Container.



Step 11. Remove Empty Sterilant Container And Discard.

WARNING: Always verify that the sterilant container is empty.

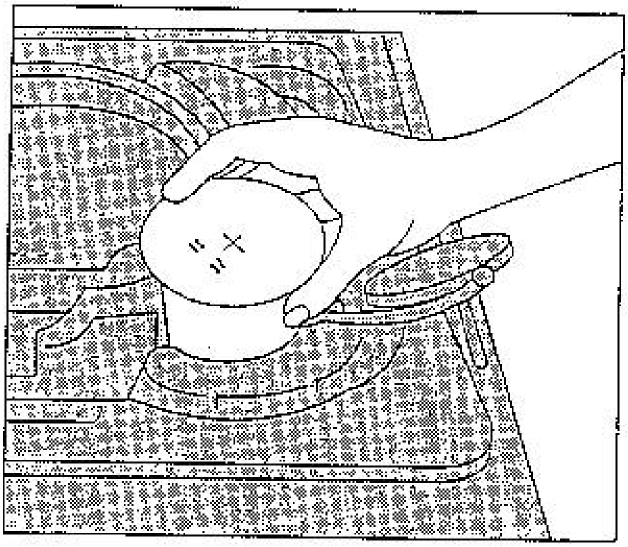
If the container is not empty, then the load cannot be considered sterile. Refer to Section 3.7 for disposal instructions.

Call STERIS.

Step 12. Remove Processed Items.

Processing Tray/Container:

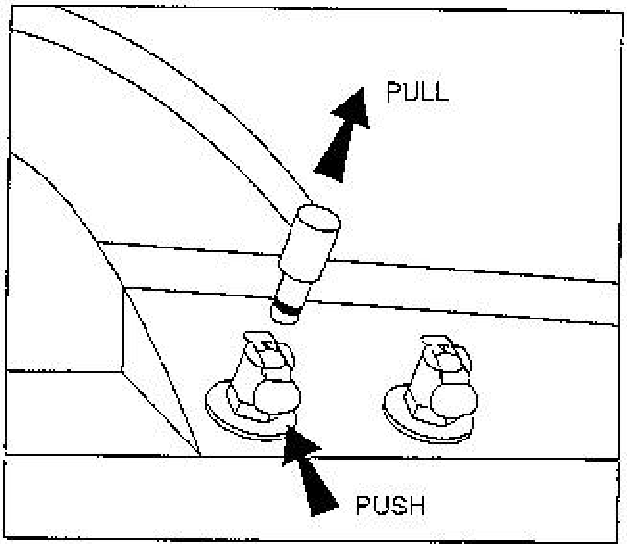
Follow departmental procedures for removal and transportation to the sterile field.



Flexible Processing Tray:

Disconnect all tubing from left and right fluid ports. Remove all tubing and adapters from the device.

Follow departmental procedures for removal and transportation to the sterile field.



3.6 CANCELLED CYCLE: MODEL 89A1, 90B1, 90A1 AND 90A2

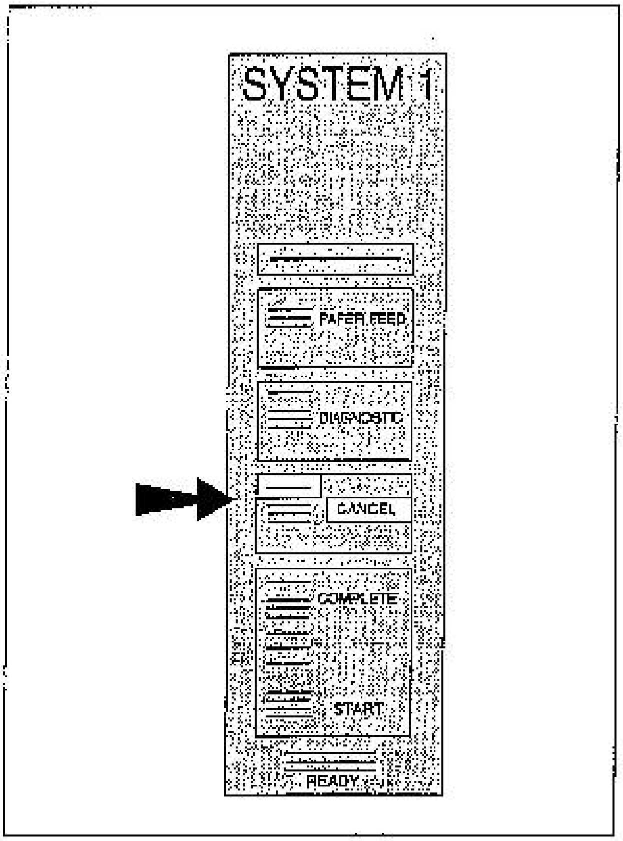
The CANCEL function will be initiated automatically by the SYSTEM 1 if one or more of the parameters for sterilization have not been achieved or maintained. A cycle may also be cancelled by the operator. In either case, whenever CANCEL occurs, the devices will NOT be sterilized and/or adequately rinsed.

The reason for cancellation and the stage the cycle is in at the time of cancellation must be taken into consideration when developing departmental policies and procedures for the disposition of the devices. Minimum requirements should include adequate rinsing of the devices and alternative processing procedures.

⚠ **WARNING : Devices are not sterilized and/or adequately rinsed when a sterile processing cycle is cancelled.**

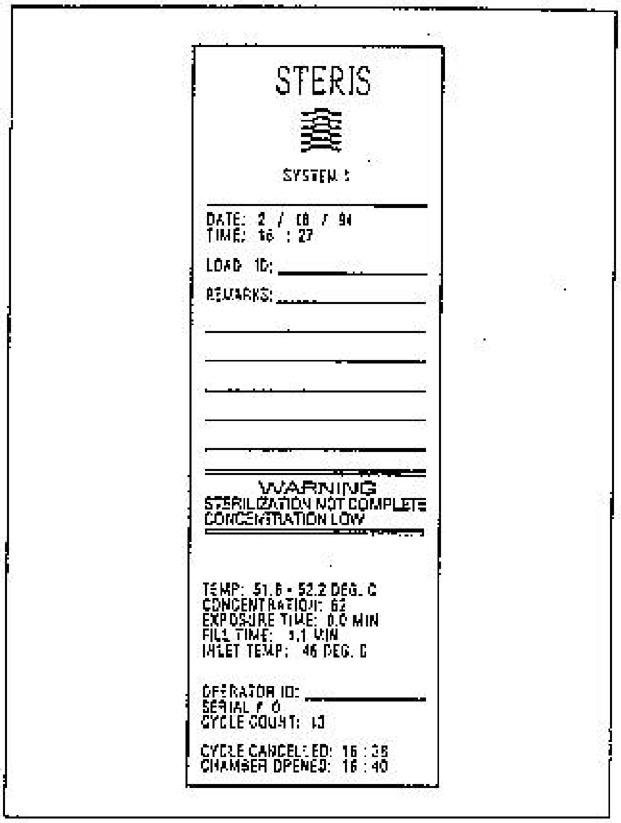
Step 1. The CANCEL light will come on. The unit will start to drain. The printer will start to print.

Approximately 40 seconds later, there will be a warning tone for five seconds.



Next, the COMPLETE light will come on. The CANCEL light remains on.

Cycle information including the message WARNING STERILIZATION NOT COMPLETE and the reason will be printed. Cycle cancelled time is also recorded. The printout advances to show the warning message.



STERIS

SYSTEM 1

DATE: 2 / 18 / 94
TIME: 16 : 27

LOAD ID: ____________

REMARKS: ____________

WARNING
STERILIZATION NOT COMPLETE
CONCENTRATION LOW

TEMP: 51.6 - 52.2 DEG. C
CONCENTRATION: 62
EXPOSURE TIME: 0.0 MIN
FILL TIME: 1.1 MIN
INLET TEMP: 46 DEG. C

OPERATOR ID: ____________
SERIAL # 0
CYCLE COUNT: 13

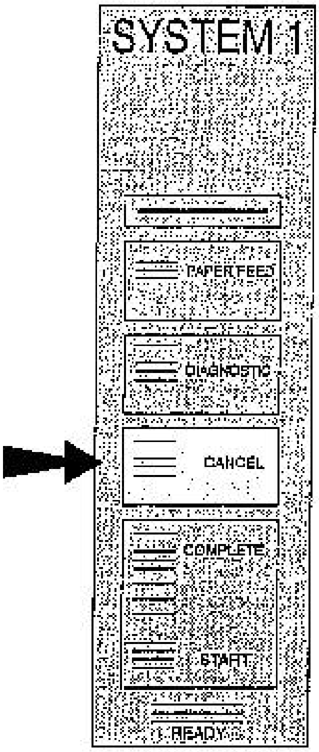
CYCLE CANCELLED: 16 : 38
CHAMBER OPENED: 16 : 40

Step 2. Look into the processing chamber to verify that the fluid has drained from the chamber.

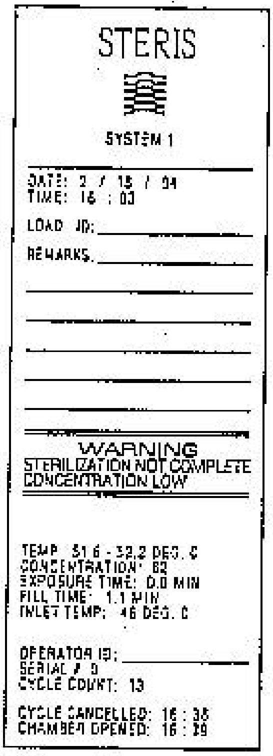
⚠ **CAUTION: If fluid remains in the chamber call STERIS.**

Step 3. Press CANCEL Button.

Inflatable seal will deflate.



The printer will print the chamber-opened time and advance to show the completed record.



STERIS

SYSTEM 1

DATE: 2 / 15 / 94
TIME: 16 : 03

LOAD ID: ____________

REMARKS. ____________

WARNING
STERILIZATION NOT COMPLETE
CONCENTRATION LOW

TEMP 51.6 - 52.2 DEG. C
CONCENTRATION: 82
EXPOSURE TIME: 0.0 MIN
FILL TIME: 1.1 MIN
INLET TEMP: 46 DEG. C

OPERATOR ID: ____________
SERIAL # 0
CYCLE COUNT: 13

CYCLE CANCELLED: 16 : 38
CHAMBER OPENED: 16 : 39

Step 4. Lift Handle– Open Lid.

The lid may be opened as soon as the seal deflates. CANCEL light is OFF.

COMPLETE light is OFF.

READY light is oON.

Step 5. Dispose of sterilant.

Refer to Section 3.7 for sterilant disposal instructions.

Refer to "Troubleshooting" located in Section 8 of this manual. Find the problem and follow the instructions.

3.7 DISPOSAL OF STERIS 20

• Spillage Of STERIS 20 Use-Dilution

While accidental spillage of the STERIS 20 use-dilution is an unusual event, it may occur. It is important not only to appropriately clean up the spill, but also to determine the cause of the problem and correct it.

Step 1. Press the CANCEL button.

Step 2. When cancellation is complete, unplug the unit.

Step 3. Increase ventilation to remove any strong, tear-producing vapors.

Step 4. Put on the following protective attire: waterproof gloves, apron and chemical goggles or face shield. Wear protective attire for the entire procedure.

Step 5. Rinse to a non-blocked (clear) floor drain if available;

OR

Wipe up liquid with absorbent towels, sponges or mops.

Thoroughly rinse the area and dry.

Towels, sponges, or mops–whether reusable or disposable–used to clean up spillage, must be thoroughly rinsed before disposal into the appropriate receptacles (i.e., trash or soiled linen).

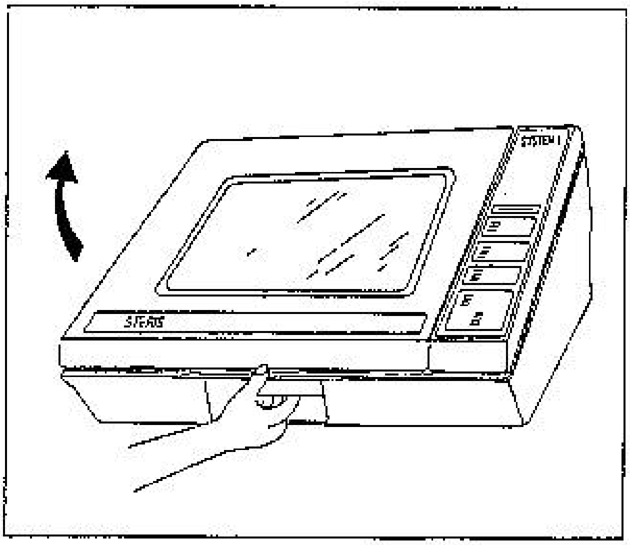
Step 6. Dispose of the STERIS 20 sterilant container in the unit.

Follow the instructions for "DISPOSAL OF STERIS 20 • ONE CONTAINER."

• One Container

Step 1. Increase ventilation to remove any strong, tear-producing vapors.

Step 2. Shut off ignition sources and do not smoke.



Step 3. Put on the following protective attire: waterproof gloves, apron and chemical goggles or face shield. Wear the protective attire during the entire procedure.

Step 4. Remove individual box and container and submerge in a sink filled with at least 12" (305 mm) of water.

Step 5. While submerged, remove container from box. Rinse box in water and drain. Discard box following procedures for clean paper waste.

Step 6. Open the submerged container manually to dilute the remaining acid. Using a pair of scissors, insert the tip into the cross section in the top center of the container (aspirator probe insertion point) and cut both the inner and outer cups in half. Avoid splashing or spraying. Dilute both liquid (peracetic acid) and powders in the water.

Step 7. Drain sink and rinse residual powders away.

Step 8. Rinse inner and outer cups with copious amounts of running water (at least 1 gal [3.8 L] per cup).

Step 9. Thoroughly drain the containers and discard following procedures for clean plastic/paper waste.

• More Than One Container

Step 1. Increase ventilation. Use fans, open doors, etc., to remove any strong, tear-producing vapors.

Step 2. Shut off ignition sources and do not smoke.

Step 3. Put on the following protective attire: waterproof gloves, apron, chemical goggles or face shield or self-contained breathing apparatus (if available). Wear the protective attire during the entire procedure.

Step 4. Remove boxes (with containers) or case to a large rinse area (floor drain or large sink).

Step 5. Rinse with at least 20 gal (76 L) of water (2-3 minutes of open tap).

WARNING: Do not attempt to manually open any leaking container until the outside of the containers and boxes are thoroughly rinsed.

Step 6. Remove an individual box and container and submerge in a sink filled with at least 12" (305 mm) of water.

Step 7. While submerged, remove container from the box. Rinse box in water and drain. Discard box following procedures for clean paper waste.

Step 8. Open the submerged container manually to dilute the remaining acid. Using a pair of scissors, insert the tip into the top cross section in the center of the container (aspirator probe insertion point) and cut both the inner and outer cups in half. AVOID SPLASHING OR SPRAYING. Dilute both liquid (peracetic acid) and powders in the water.

Step 9. Drain sink and wash residual powders away.

Step 10. Rinse inner and outer cups with copious amounts of running water (at least 1 gal [3.8 L] per cup).

Step 11. Thoroughly drain the containers and discard following the procedures for clean plastic/paper waste.

• In A "No Water Available" Area

Step 1. Increase ventilation to the area – open truck or warehouse doors, use fans to remove any strong, tear-producing vapors.

Step 2. Shut off ignition sources and do not smoke.

Step 3. Put on the following protective attire: waterproof gloves, apron, and chemical goggles/face shield or self-contained breathing apparatus.

Step 4. Seal boxes with containers into plastic bag(s) and take to a water source.

WARNING: Do not attempt to manually open any leaking or broken container until water is available.

When water is available, follow the procedure for "DISPOSAL OF STERIS 20 • MORE THAN ONE CONTAINER".

Section 4: Principles of Operation

4.0 GENERAL

The SYSTEM 1® Sterile Processing System has been offered with the model numbers given below. Each model number designates a separate voltage (or control platform) configuration. Refer to the listing to determine voltage:

89A1-original 60 Hz 120 VAC released product.

90B1-brief production run of 120 VAC, 60 Hz unit manufactured with high pressure pump switch.

90A1-230 VAC, 50 Hz

90A2-120 VAC, 60 Hz

99A1-230 VAC, 50 Hz, with enhanced control platform.

99A2-120 VAC, 60 Hz with enhanced control platform.

Although there are several SYSTEM 1 unit models, the cycle sequence remains consistent across the product offering. The opening paragraphs of this section describe, in general, the cycle sequence used by the SYSTEM 1. This cycle sequence is similar between all variations of the equipment. Electrical components account for most variations between different models; these differences will be explained in later sections.

All versions of the SYSTEM 1 run only two cycles: a Sterile Processing Cycle and a Diagnostic Cycle. There are no user or service adjustments that can be made to alter either cycle sequence or parameter set points. The Sterile Processing Cycle is used for the processing of medical equipment, while the Diagnostic Cycle is a daily test cycle that verifies the operation of the unit components.

Accessories such as processing trays and quick connects will not be addressed in this manual.

4.1 OVERVIEW OF THE STERIS PROCESS

The STERIS PROCESS™ employs the SYSTEM 1, specialized JIT™ Processing Trays and Containers, and STERIS 20™ Sterilant Concentrate for the rapid, safe and standardized sterile processing of immersible surgical and diagnostic devices.

The SYSTEM 1 is an automated, microcomputer controlled device designed to maintain the process parameters necessary to support standardized and effective sterile processing. The entire STERIS PROCESS takes place within the environmentally sealed chamber of the unit. Processing temperatures do not exceed the safe temperature limits that most manufacturers recommend to assure protection of heat-sensitive devices. Upon completion of each cycle, a printout is produced to document the process and load information.

Various processing trays and containers permit the unit to accommodate a wide variety of devices and procedure specific sets. The specialized trays and containers are designed to enable the operator to fix devices in the appropriate position for sterile processing, assure a continuous exchange of sterilant and rinse on exposed surfaces of the devices (including lumens).

STERIS 20 is a chemical sterilant concentrate developed exclusively for use in the SYSTEM 1 unit. The active ingredient in STERIS 20 is peracetic acid, an effective chemical sterilant. The proprietary formulation also contains chemicals which buffer the use dilution to an approximately neutral pH and which minimize corrosion or degradation of the devices being processed.

STERIS 20 Sterilant Concentrate is sealed in a single-use container to assure safe handling and optimal concentration of sterilant per cycle. The unit automatically prepares the use dilution of STERIS 20 within the sealed processing chamber. It is the use dilution, not the concentrate, to which devices are exposed.

4.2 GENERAL COMPONENT DESCRIPTION

Refer to Figure 4-1 for this section. This figure shows the general components used in the SYSTEM 1 unit. The unit can be broken down into the following subsections:

1. Sterile Fluid Pathway
2. Sterile Water Filter Housing
3. Air Manifold

Table 4-1. Component List (Figure 4-1)

Flow Chart Name	Common Name
Float Block Assembly	
CK1	Air inlet check valve
CK2	Float block drain check valve
CK3	Float block drain check valve
LS3	Float block switch
FLT2	Sterile air filter
Sterile Filter Housing Assembly	
FLT1	Sterile filter housing
CK4	Backflow preventer check valve
PT1	Pressure transducer
SOL8	Air-water solenoid valve
Air Manifold Assembly	
CK5	Air manifold check valve
CK6	Air-water check valve (in air manifold)
CK7	Air manifold check valve
LS2	Seal pressure safety switch
LS5	Compressor control switch
SOL1	Compressor release solenoid
SOL2	Seal release solenoid
SOL3	Circulation pinch valve solenoid
SOL4	Drain pinch valve solenoid
Drain Block Assembly	
CK8	Drain check valve
TC3	Thermocouple #3 (drain block assy)
High Pressure Pump Assembly	
CK9	Pressure relief valve (internal to pump 2)
P2	High pressure pump
LS6	H.P. pump monitor (pressure switch)
Heater Housing	
HTR1	Heater element
LS1	Thermal Cutoff Switch
TC1	Thermocouple #1 (drain transition block)
High Pressure Transition Block	
CP1, CP2	Concentration probes
TC2	Thermocouple #2 (high pressure transition block)
Dual Water Inlet Assembly	
SOL5	Dump valve
SOL7	Inlet fill valve
Miscellaneous Components	
CK10	Anti-siphon check valve
COMP	Air compressor
LS4	Lid switch
P1	Circulation pump
S	Inflatable seal
V5	Drain pinch valve
V6	Circulation pinch valve

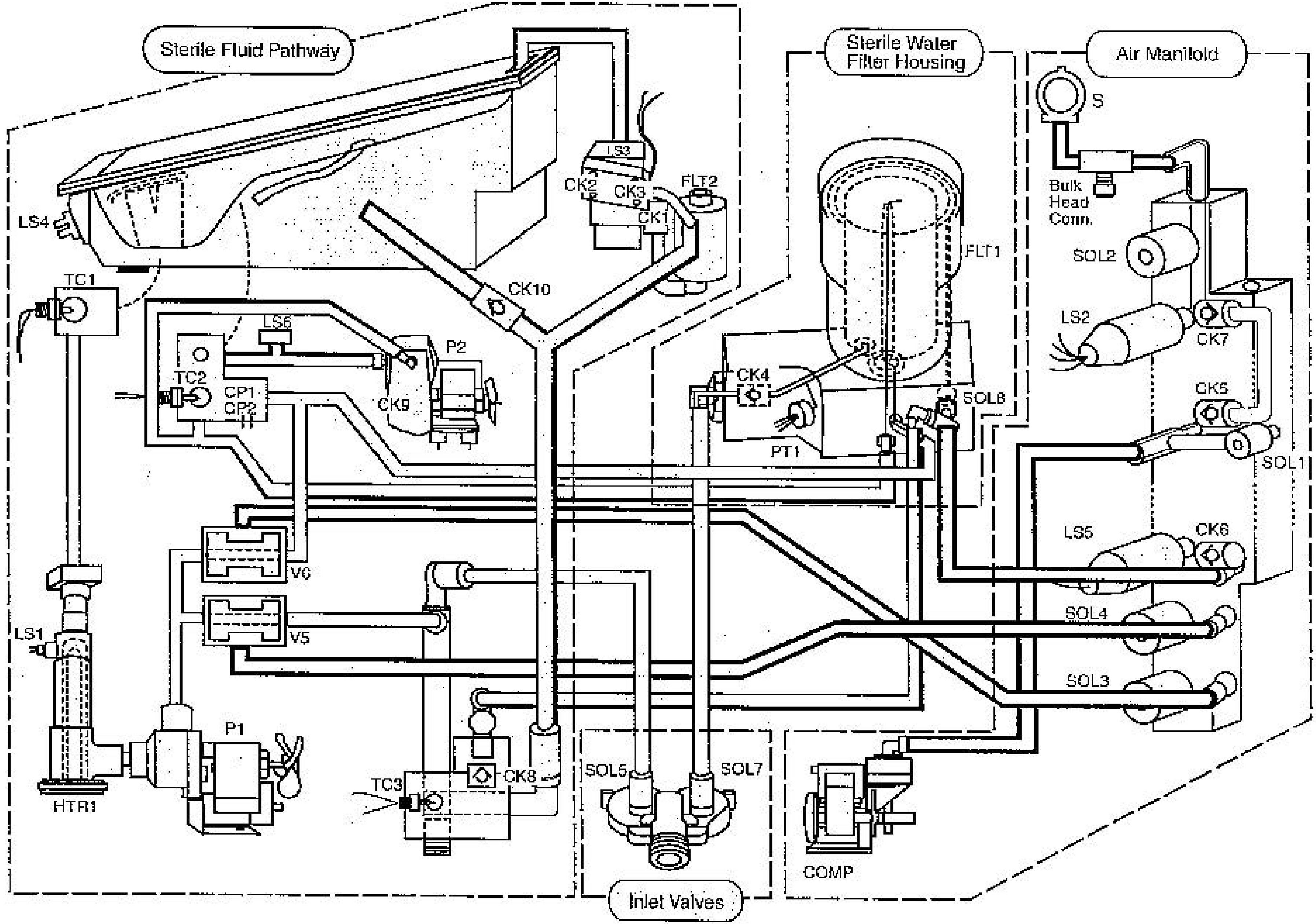

Sterile Fluid Pathway
Sterile Water Filter Housing
Air Manifold
S
Bulk Head Conn.
SOL2
LS2
CK7
CK5
SOL1
LS5
CK6
SOL4
SOL3
COMP
FLT1
SOL8
CK4
PT1
LS3
CK2
CK3
CK1
FLT2
LS4
CK10
TC1
LS6
P2
TC2
CP1
CP2
CK9
V6
V5
LS1
HTR1
P1
TC3
CK8
SOL5
SOL7
Inlet Valves

Figure 4-1. General Components

4.2.1 Sterile Fluid Pathway Description

A water tight processing chamber is formed when the inflatable seal forces the processing adapter tray against the upper seal on the lid.

During the "dump" portion of the cycle, tap water flows from the inlet, through dump valve (SOL5), past thermocouple #3 (drain block assembly) (TC3), and out the drain. The chamber and main system plumbing are closed-off by the actuated drain pinch valve (V5).

During chamber filling, tap water flows through inlet fill valve (SOL7) and backflow preventer check valve (CK4), across the sterile filter membrane, through the pressure transition block and into the chamber. Circulation pinch valve (V6) opens, filling circulation pump (P1), heater drain transition blocks and the chamber. During fill, air exhausts through the vent hole in the lid, into the float block, through CK2 and CK3, and out the drain. At completion of fill, water enters the float block and raises the float. SOL7 is then closed.

During circulation, fluid exits the chamber through the right drogue of the processing adapter tray (under the sterilant container), through the drain transition block, past thermocouple #1 (drain transition block) (TC1), and into the heater housing. Fluid continues past the heater and is flowed by circulation pump (P1) through V6 to the high pressure transition block, past concentration probes (CP1/CP2) and thermocouple #2 (high pressure transition block) (TC2), and into the processing chamber through the processing tray container interface.

A portion of the fluid is flowed through the high pressure pump (P2) at 16.5 ±3 psi for 60 Hz units, or 16 ± 3 psi for 50 Hz units, through the smaller connector post/drogue to the processing tray container adapter to provide higher pressure directed flow for lumens. Also, a portion of the fluid is circulated through the inside system plumbing, to contact the inside surface of the sterile filter membrane.

The chamber is drained by P1 through V5 after V6 is closed.

The float block assembly has two basic functions. First, to maintain near-neutral chamber pressures. Second, the float block assembly provides indication of chamber-full condition and loss of sterilant from the chamber.

During fills, float block drain check valves (CK2 and CK3) allow air to be purged from the chamber to drain, and at the end of fills, allow any excess fluid to drain. As fluid is pumped to drain, its volume in the chamber is replaced by air drawn through sterile air filter (FLT2) and air inlet check valve (CK1). Chamber fills are terminated when air has been exhausted, drained water enters the float block assembly, which raises LS3. System fluid loss is detected when the float switch drops. This drops occurs when a sufficient fluid volume loss from the system and float block assembly cracks open CK1, which lets air in, displacing fluid from the float block and causing LS3 to drop.

4.2.2 Sterile Water Filter Housing Description

The sterile filter housing assembly houses a 0.2-micron absolute filter to provide sterile water to rinse processed instruments and also provides an air-tight chamber around the outside of the filter to accommodate pressure-hold tests for filter integrity.

Following replacement of the sterile water filter cartridge, through the removable filter housing cap, the filter is surrounded by air, both inside and outside. During a fill, water enters through CK4 and fills around the outside of the filter. Air trapped outside the filter is vented to drain through the normally de-energized air-water solenoid valve (SOL8), and is vented to drain through drain check valve (CK8).

Water passes through the sterile filter and through both the housing's bottom port and standpipe to the unit's system plumbing. During sterilization cycles, sterilant circulates into the top port and out the standpipe bottom port to sterilize the inside of the filter and to remove any trapped air. Also, during circulation, a positive pressure is generated by the ciculation pump (P1) and held in the filter housing by the inlet and drain check valves (CK4 and CK8, respectively).

During DIAGNOSTICS, the sterile filter membrane test is conducted to verify integrity of the sterile water filter membrane. SOL8 is energized to close the path to drain and to open the filter housing chamber, outside the sterile filter to the air manifold. Housing pressure is allowed to stabilize, and then its decay is monitored by the pressure transducer (PT1).

4.2.3 Air Manifold Description

Air from air compressor (COMP) enters air manifold at fitting.

NOTE: Air compressor (COMP) maintains 31 to 43 psi in the air system.

SOL1 is de-energized when the compressor is turned off to vent the compressor output line to atmosphere. This prevents the compressor from starting while under load. SOL1 is also energized when the compressor is turned on. Air manifold check valve (CK5) prevents loss of system air pressure.

Compressor control switch (LS5) controls air compressor operation. It opens at 40 ± 3 psi, turning the compressor off; and closes when pressure drops by 5 ± 1 psi, turning the compressor on.

Inflatable seal is inflated through air manifold check valve (CK7), which maintains air pressure until SOL2 is energized open, venting the seal to atmosphere.

LS2 prevents water flow related components from energizing until seal pressure reaches 30 ± 3 psi, at which pressure the switch closes. Should the seal pressure drop below 24.5 ± 4.5 psi during operation, LS2 opens, and the cycle ends (aborts). The drain sequence is initiated following an abort.

Air-water solenoid valve (SOL8) is used only during the sterile filter membrane test of DIAGNOSTICS.

Air pressure to operate the drain and circulation pinch valves is supplied through fittings. These pinch valves are operated by the circulation pinch valve and the drain pinch valve solenoid (SOL3 and SOL4).

The pinch valves are used for supplying water to the unit and diverting water to drain.

A list of the components used in the unit is shown in Table 4-1.

4.3 PRINCIPLES OF OPERATION - STERILE CYCLE DESCRIPTION

Refer to the cycle graph for the Sterile Cycle (P-755716-365, located at the end of this section) when reviewing the following description. Note that the "events" listed coincide with event number on the cycle graph.

Event 0 – This is an out-of-cycle condition with power supplied to the unit. All solenoid valves are OFF at this point.

Event 1 – Cycle Start: The operator must press the START button. The control checks lid switch (LS4) for a latched lid. If lid is latched, control progresses to Event 2.

If at any time during the cycle LS4 is detected open, an alarm occurs and the cycle aborts. (Alarm: "CHAMBER OPEN.")

Event 2 – Compressor Operation: The control enables output to air compressor (COMP) and SOL1, inflating the seal. LS5 controls COMP output pressure. Note that LS2 is activated by compressed air and allows electrical power to be supplied to various components. Control also prints header on cycle tape. While header is printing, control progresses to Event 3.

Event 3 – Seal Inflation: Control allows ten seconds for seal inflation. After ten seconds, control progresses to Event 4.

Event 4 – HP Pump OFF Test: H.P. pump monitor (pressure switch)(LS6) checked for open condition. Since the P2 H.P. Pump is not running at this point, LS6 should not be activated. This step verifies the switch has not failed in the closed condition. If LS6 is open, control energizes drain pinch valve solenoid (SOL4) and SOL5. Control progresses to Event 5. If, however, LS5 is sensed closed, an alarm occurs and the cycle aborts. (Alarm: "HP PUMP FAILURE 0," or–for Model 99 units–"HP PUMP FAILURE: PUMP OFF.")

Event 5 – Water Temperature Test: SOL4 is energized to close V5. SOL5 is energized. Water flows into the SYSTEM 1 through SOL5, past TC3, which monitors for water temperature greater than 42°C (108°F). Water temperature is monitored for a minimum of 20 seconds. Temperature monitoring continues until the minimum temperature requirement has been met, or 120 seconds have passed. SOL5 is de-energized once either of these conditions has been met.

If, at any time during the entire cycle, a temperature >60°C (140°F) is measured, an alarm occurs and the cycle aborts. (Alarm: "TEMPERATURE OVER 60 DEG")

Event 6 – Fill: SOL4 remains energized from Event 5. V5 closes while SOL7 is energized, allowing water to flow into the SYSTEM 1, past CK4 and the sterile water filter, for five seconds. Note that V6 is open at this point, allowing water to fill piping on both sides of the pinch valve. After five seconds, control proceeds to Event 7.

Event 7 – Fill, continued: Circulation pinch valve solenoid (SOL3) energizes, V6 closes, diverting incoming water towards the processing chamber. After 30 seconds, control proceeds to Event 8.

Event 8 – Circulation Pump (P1) Prime: SOL3 de-energizes, re-opening V6, allowing incoming water to enter and prime circulation pump (P1). Control proceeds to Event 9.

Event 9 – Chamber Full: Chamber fills with water until float switch in the float block rises, causing LS3 to open. Note that air from the chamber is vented through the float block through check valves CK2 and CK3. An alarm occurs if a full chamber has not been sensed within 5 minutes. If this time limit elapses, the cycle aborts. (Alarm: "FILL PROBLEM.") A warning message is printed if fill takes longer than two minutes. Control proceeds to Event 10.

Event 10 – Stabilize: SOL7 de-energizes and control waits ten seconds before proceeding to Event 11.

Event 11 – Circulation Pump Prime: SOL4 de-energizes for one second, opening V5. This removes any air that may be trapped in P1. Control proceeds to Event 12.

Event 12 – Water Circulation prior to Heating: SOL4 energizes, closing V5, and P1 energizes, pumping water through unit. This purges air from the remainder of the piping. Control proceeds to Event 13 after 30 seconds.

Event 13 – Heating: HTR1 energizes, TC1 and TC2 monitor water temperature in chamber. Control proceeds to Event 14 when fluid temp is > 50°C. Time in this phase will be dependent on the inlet water temperature. If 50° is not reached, an alarm occurs and the cycle aborts. (Alarm: "HEAT PROBLEM.")

Event 14 – Stabilize: HTR1 and P1 de-energize. This allows any air still in the system to rise and travel to the float block. After six seconds, control proceeds to Event 15.

Event 15 – Refill: SOL7 energizes for six seconds, further removing any air in the system. Control proceeds to Event 16.

Event 16 – Check for Full Condition: LS3 is checked. If open (chamber full condition), control proceeds to Event 17. If closed (chamber not full), SOL7 energizes for eight seconds, then proceeds to Event 17.

Event 17 – P1/P2 Pump Operation: Control waits until 20 seconds has elapsed since temperature has reached 50°C, then P1 and P2 energize. After 25 seconds, control proceeds to Event 18.

Event 18 – Final Heat: HTR1 energizes, TC1 and TC2 monitors water temperature. Control proceeds to Event 19 when TC1 > 51.5°C.

Event 19 – Exposure Phase Start: Control enters exposure phase, starts 12-minute timer and monitors LS6 for closed condition. If LS6 is not sensed closed, an alarm occurs and the cycle aborts. (Alarm: "HP PUMP FAILURE 1," or–for Model 99 units–"HP PUMP FAILURE: PUMP ON.") Otherwise, control proceeds to Event 20.

Event 20 – Exposure Phase: HTR1 cycles on/off to maintain TC1 between 53 and 55°C. HRT1 is energized if TC1 < 53°C and HTR1 is de-energized if TC2 > 55°C.

The chamber fluid temperature is monitored during the 12-minute exposure. If temperature drops below 50°C at any time during exposure, an alarm occurs and the cycle aborts. (Alarm: "TEMPERATURE UNDER 50 DEG.")

The concentration monitor circuit is checked during the 12-minute exposure. If a reading of <175 counts is measured, an alarm occurs and the cycle aborts. (Alarm: "CONCENTRATION LOW.")

The chamber fluid level circuit is checked during the 12-minute exposure. If LS3 senses a not-full condition, an alarm occurs and the cycle aborts. (Alarm: "CHAMBER LEVEL LOW.")

Control proceeds to event 21 after 12 minutes.

Event 21 – Drain: HTR1 de-energizes, and SOL4 de-energizes, opening V5. P1 remains energized and P2 de-energizes. SOL3 energizes, closing V6. Unit drains. After 40 seconds, control proceeds to Event 22.

Event 22 – Rinse Fill: P1 de-energizes and SOL3 de-energizes, opening V6. SOL4 energizes, closing V5 and SOL7 water fill valve energizes, filling chamber with water for rinse. After five seconds, control proceeds to Event 23.

Event 23 – Rinse Fill Continue: SOL3 energizes, closing V6. Chamber continues filling. Control proceeds to Event 24 when LS3 opens, sensing a full chamber condition.

Event 24 – P1 Circulation Pump Prime: SOL3 de-energizes, opening V6, SOL4 de-energizes, opening V5, and SOL7 de-energizes. Control proceeds to Event 25 after one second.

Event 25 – Rinse: SOL4 energizes, closing V5, and P1 and P2 energize. Control proceeds to Event 26 after ten seconds.

Event 26 – Rinse Drain: SOL3 energizes, closing V6, SOL4 de-energizes, opening V5, P1 remains energized and P2 de-energizes. Unit drains for a fixed 40 seconds.

The control performs a total of four rinses, repeating events 22 to 26 for a total of four times. During the final drain, after the fourth rinse, the control checks the LS6 for an open condition. If not sensed open, an alarm occurs and the cycle aborts. (Alarm: "H.P. PUMP FAILURE 0," or–for Model 99 units–"H.P. PUMP FAILURE: PUMP OFF.") At successful completion of the test, the control continues with Event 27.

Event 27 – Final Drain: P1 is de-energized, SOL4 is energized, closing V5, and P2 and SOL3 remain energized. After 60 seconds, control proceeds to Event 28.

Event 28 – Cycle Complete: P2, SOL3, and SOL4 de-energize. Printer prints cycle summary, audible end-of-cycle tone sounds, and complete is indicated. Control proceeds to Event 29 after operator presses CANCEL button.

Event 29 – Seal Deflate: COMP1 de-energizes and SOL2 energizes. Seal deflates and chamber open time is printed on cycle tape. Control proceeds to Event 30 when printer stops printing.

Event 30 – Return to Ready: SOL2 de-energizes after 15 seconds and enters a READY state.

Other alarm monitoring conditions:

1. Power Failure – anytime during a cycle where loss of power is sensed, an alarm occurs and the cycle aborts. (Alarm: "POWER FAILURE.")
2. Temperature Problem – anytime a temperature sensor on the control board senses an out-of-range condition, an alarm occurs and the cycle aborts. (Alarm: "TEMP. PROBLEM.")

4.4 PRINCIPLES OF OPERATION - DIAGNOSTIC CYCLE DESCRIPTION

The Diagnostic Cycle is a test cycle used to check the operation performance of the SYSTEM 1. Refer to the Diagnostic Cycle Graph (P/N P-755716-415) when reviewing the following description. Note that the "Events" listed coincide with event number on the cycle graph.

Event 1 – DIAGNOSTIC button is pressed. If LS4 is closed, cycle continues to Event 2; if door switch is not closed, cycle will not start.

Event 2 – Printer starts to print header, COMP and SOL1 are energized.

Event 3 – Test # 1: A/D converter test. If power supplied to the control is within limits, cycle continues to event 4. If test fails, an alarm occurs (alarm: "A/D CONVERTER FAULT") and cycle aborts. The printout indicates the voltage value measured in the event of a failure. (Voltage value printout only occurs on Model 89 and Model 90 units.)

Event 4 – Test #2: Inlet Water Temperature test. Control energizes SOL4, closing V5 and SOL5, diverting incoming water past TC3 directly to drain. This test runs for a minimum of 20 seconds and up to a maximum of 180 seconds. If temperature exceeds 38°C, cycle progresses to Event 5. If temperature measured is <38°C, the test fails and an alarm occurs (alarm: "INLET TEMP. <43 DEG") and cycle aborts. The printout indicates the water temperature in the event of a failure.

Event 5 – Test #3: Fill Time test. SOL4 remains energized, keeping V5 closed. SOL5 is de-energized while SOL7 is energized, thus allowing water to fill the chamber. During the first 20 seconds of fill, PT1 is monitored; the water pressure is stored as the FP (Fill Pressure) variable.

The chamber continues to fill until LS3 reads open or until 180 seconds has elapsed. SOL7 is then de-energized. If the fill time exceeds 180 seconds, the test fails, an alarm occurs (alarm: "FILL TIME > 3 MIN.") and the cycle aborts. If the test passes, the cycle continues to Event 6.

Event 6 – Test #4: Pressure Transducer test. SOL4 is de-energized for one second, then re-energized. P1 energized (turned ON) for four seconds, then de-energized (turned OFF). For 25 seconds, chamber pressure is allowed to stabilize. PT1 is then monitored for 60 seconds. The average value is stored as the FZ (Fill Zero) variable. Note that the pressure should be greater than 0 since the PT1 is reading the head pressure due to the water level in the unit.

After the 60 seconds has elapsed, the software looks at the FZ and FP values. If FP <5.85 psi or FZ > 1.17 psi, the test fails and an alarm occurs (alarm: "PRESSURE XDUCER FAULT"), and the cycle aborts. The printout indicates the pressure transducer reading in psi in the event of a failure. If test passes, the cycle continues to Event 7.

Event 7 – Test #5: Circulation Pressure test. The control energizes P1. After 30 seconds, the P1 pump continues to run and the control monitors the pressure transducer for a full 60 seconds. The values measured are averaged and stored as CP (Circulation Pressure).

The control makes a calculation using variables CP and FZ, such that, if CP<FZ + 2.75 counts (Model 89 and Model 90) or CP<FZ + 1.073 psi (Model 99), the test fails and an alarm occurs (alarm: "CIRCULATION PRES. LOW") and the cycle aborts. The printout indicates the value for CP in the event of a failure. If test passes, cycle continues to Event 8.

Event 8 – Test #6: Thermocouple test. The temperatures read by TC1 and TC2 are compared. If within 3°C of each other, cycle continues to Event 9; if >3° C, test fails, and an alarm occurs (alarm: "THERMOCOUPLE FAILED") and the cycle aborts. The printout indicates the values for TC1 and TC2 in the event of a failure.

Event 9 – Test #7: Circulation Valve test. The control energizes SOL3, closing V6. If the pinch valve is working properly, the pressure transducer will no longer see pressure from the circulation pump.

The control waits ten seconds, then monitors and averages the pressure transducer PT1 for 20 seconds and stored value CZ (Circulation Zero). The values for CZ and CP are compared. If the difference is >0.975 psi on Model 99 unit or >2.5 counts on Model 89 and 90 units, cycle continues to Event 10. If the differences are less than values specified, an alarm occurs (alarm: "CIRC. VALVE FAULT"), and the cycle aborts. The printout indicates the measured difference in the event of a failure.

Event 10 – Test #8: Heat Rate test. The control de-energizes SOL3, opening the V6 and allows five seconds for chamber fluid to stabilize. LS3 is checked for a chamber full condition. If not full, P1 de-energizes and SOL7 energizes until LS3 senses a chamber condition.

Once full, the control energizes P1 and HTR1, and de-energizes SOL7. After, TC1 is read and the value stored in memory. After heating for 60 seconds more, TC1 is read. If temperature has increased by 1°C, cycle continues to Event 11. Otherwise, the control will heat for up to 120 seconds more, measuring the temperature increase after 60 seconds and then after 120 seconds. If temperature increases by 1°C per minute, the cycle continues with Event 11;otherwise the test fails and an alarm occurs (alarm: "HEAT RATE LOW"), and the cycle aborts. The printout indicates the temperature rate measured in the event of a failure.

Event 11 – Test #9: Drain Valve test. HTR1 de-energizes and LS3 is checked. If a not-full condition is found, then fluid has leaked out through the drain valve, and the test fails and an alarm occurs (alarm: "DRAIN VALVE FAULT"), and the cycle aborts. Otherwise, cycle continues to Event 12.

Event 12 – Test #10: Drain Time test. The control de-energizes SOL4, opening V5 and energizes SOL3, closing V6. P1 remains on and unit starts to drain. The control monitors the time required for LS3 to sense a not-full condition. If the time it takes LS3 to sense not-full is greater then five seconds, the test fails, an alarm occurs (alarm: "DRAIN TIME FAULT"), and the cycle aborts. Otherwise, cycle continues to Event 13.

Event 13 – Test #14: H.P. Pump test. During the beginning of the drain phase, the control monitors LS6 for open (no pressure) condition. If LS6 is not sensed open within ten seconds, the test fails and an alarm occurs (alarm: "HP PUMP FAULT," or – for Model 99 units – "H.P. PUMP FAULT: CLOSED") and the cycle aborts. Otherwise the control energizes SOL4, closing V5, and energizes P2. The control waits five seconds and then reads LS6 for 20 seconds. If the switch closes (senses pressure) in allotted time, the control de-energizes SOL4, opening the V5 and the drain continues for the remaining 40-second time period (60-second time period for Model 99). Cycle continues to Event 14. If the test fails, an alarm occurs (alarm: "HP PUMP FAULT," or – for Model 99 units – "H.P. PUMP FAULT: OPEN") and the cycle aborts.

Event 14 – Test #11: Concentration Monitor test.

Model 99 units take a reading of the concentration monitor during the heat rate test. The highest reading is stored in memory. At the end of the drain phase, SOL3 and P1 de-energize; however P2 remains energized for five additional seconds. During the drain phase a second concentration reading is taken. The difference between the two readings must be >3 counts. If <3 counts, the test fails and an alarm occurs (alarm: "CONC. MONITOR FAILED") and the cycle aborts. Otherwise, the cycle continues to Event 15.

On Model 89 and Model 90 units, at the end of the 40-second drain, the control de-energizes SOL3, P1 and P2. The control reads the concentration probes and stores that value in memory. The control proceeds in concentration test using PC board level hardware and compares the stored value with the calculated value. If the two readings do not match, the test fails, an alarm occurs (alarm: "CONC. MONITOR FAILED"), and the cycle aborts. Otherwise, the cycle continues to Event 15.

Event 15 – Test # 12: Sterile Filter test. The control energizes SOL8 and controls COMP by PT1. If 40 psi is not reached within a five-minute time period, the first part of this test fails, an alarm occurs (alarm: "STERILE FILTER MEMBRANE TEST FAILED"), and the cycle aborts.

If pressure is achieved within five minutes, the test enters a five-minute stabilization phase where COMP is energized and de-energized to maintain 40 psi for five minutes. After five minutes, the control measures PT1. If <37.83 psi, the test fails, an alarm occurs (alarm: "STERILE FILTER MEMBRANE TEST FAILED"), and the cycle aborts.

If the pressure is >37.83 psi, then COMP is de-energized while SOL3 and SOL4 are energized. The control waits 15 seconds and reads PT1. If pressure is <36.73 or >43.75 an alarm will occur (alarm: "STERILE FILTER MEMBRANE TEST FAILED"). PT1 is monitored for five minutes, during which time if the pressure drop exceeds set amount (refer to Section 5), the test fails, an alarm occurs (alarm: "STERILE FILTER MEMBRANE TEST FAILED"), and the cycle aborts. In the event of a failure, the printout will indicate three values: the pressure level achieved, the pressure when the test failed, and the time (in seconds) to failure. Note that Model 89 and Model 90 units indicate pressure in counts; Model 99 units indicate pressure in psi. Otherwise, cycle continues to Event 16.

Event 16 – Test #13: Drain Check test. SOL8 is de-energized, venting the pressure from the sterile filter housing through CK8. After ten seconds, PT1 is read. If pressure is <10 counts or >30 counts (Model 89 and Model 90 units) or <3.51 psi or >11.7 psi, (Model 99 units), the test fails, an alarm occurs (alarm: "DRAIN CHECK FAULT"), and the cycle aborts. Otherwise, cycle continues to Event 17.

Event 17 – Seal deflates when SOL2 energizes and cycle is complete.

4.5 ELECTRICAL COMPONENTS - MODEL 89 AND MODEL 90 UNITS

Due to the electrical differences between the 89 and 90 Models, this section will treat each model separately.

4.5.1 Models 89 and 90B1 - refer to electrical schematic 755717-157

Incoming power is 120 VAC 60Hz and comes in through CB-1 20A circuit breaker. Power is then fed to FAN1 power supply fan, LS1 temperature limit switch (which is mounted on the heater housing), SSR1 solid state relay for the heater, COMP compressor, SOL1 compressor release solenoid, P1, SOL8 air-water solenoid valve, SOL2 seal release solenoid, LS2, and PS1 power supply. LS2 will allow power to be fed to P2, and SOL3, SOL4, SOL5 and SOL7 only when the seal is inflated and LS2 satisfied.

PS1 power supply provides power to the CPU and printer interface board. The CPU in turn supplies power to PT1 and LS4.

High current draw components HTR1, P2, COMP (with SOL1 wired in parallel), and P1 are driven by solid state relays SSR1, 2, 3 and 4 respectively. All other valves are controlled by drivers on the CPU board. All these components are 120 VAC.

The PT1 transducer is a 0 to 100 psi range unit, with an output of 1 to 6 VDC. At 0 psi the output is 1.0 V +/- 0.25 VDC. The excitation voltage is 14 VDC.

4.5.2 Model 90 A1/A2 – Refer To Electrical Schematic 300059

Incoming power is 120 VAC on 90A2 units and 220/240 VAC on 90A1 units. 90A1 units are equipped with a line input filter. Power is supplied through CB1 circuit breaker and then to a power supply line filter, and a control transformer. Power is also fed to FAN1 fan, LS1 temperature limit switch (which is mounted on the heater housing), P2 pump, COMP compressor, and P1.

The control transformer is jumpered based on incoming voltage (120 VAC or 220/240 VAC) so that the output is 24 VDC. This 24 VDC is supplied to LS2and SOL8, SOL3, SOL2 and SOL1. LS2 will supply 24 VDC to SOL5, SOL4 and SOL7 when the seal is inflated.

PS1 power supply receives power from the power supply line filter and is an auto-transformer type unit which can take either 120 VAC or 220/240 VAC and deliver 5 VDC. The 5 VDC is supplied to the CPU board, the printer interface board, LS2, and solid state relays 3, 4, and 5. Solid state relays 1 and 2 receive 5 VDC through LS2 contacts when the seal is inflated.

High current draw components HTR1, P2, COMP, and P1 are driven by solid state relays SSR 1, 2, 3 and 4 respectively. SOL 1 is driven by SSR 5. All other valves are controlled by drivers on the CPU board. The HTR1, P2, COMP, and P1 are high-voltage components (either 120 VAC or 220/240 VAC) and all solenoid valves are 24 VDC.

The PT1 transducer is a 0 to 100 psi range unit, with an output of 1 to 6 VDC. At 0 psi, the output is 1.0 V +/- 0.25 VDC. The excitation voltage is 14 VDC.

4.6 CONTROL – MODEL 99 UNITS

4.6.1 Control Assembly

The Model 99A1/A2 SYSTEM 1 control features a state-of-the-art microcomputer control system. The updated control includes an ink-on-paper impact printer and a 2-line x 16-character display, to provide visual indications to the user.

4.6.2 Control Board

The control board has two flash chips: U5 and U22. RAM is backed up by a replaceable battery.

There are ten low-current drivers, in sockets, on the board, U38 through U45, U59 and U60, that provide voltage to solenoids and solid-state relays. Each of these outputs is protected by a replaceable fuse.

Components protected by the fuses are as follows:

Fuse	Output	Component
F1	AC0	Take-up Paper
F2	AC1	S8
F3	AC2	S5
F4	AC3	S3
F5	AC4	S4
F6	AC5	S7
F7	AC6	S2
F8	AC7	Circulation Pump
F9	AC8	(Spare)
F10	AC9	(Spare)

The outputs to the solid-state relays for S1, compressor, high-pressure pump, and heater are not protected by fuses.

The control board has one dip switch labeled S1. Position 1 and 2 are used to determine the model of the pressure transducer installed (see Section 9.15). Position 3 orients the print (top-down or bottom-up), and position 4 is a self-test for the printer.

4.6.3 Interface Box Assembly

An interface box assembly replaces the Model 90 control box assembly. This interface box has an interface board which is used as a termination point for the existing unit cables. New cables run from the interface board to the control assembly.

The interface box also includes a line filter and a power supply.

4.6.4 Pressure Transducer

The new control uses a four-wire millivolt pressure transducer. There are two different brands used: NOSHOK and Ametek. The dip switch on the control board is used to configure the unit for the specific brand used (refer to Section 9.15).

The Model 99 PT1 transducer is a 0-100 psi range unit, with an output of 0-100 mV. At 0 psi, the output is 0 mV. The excitation voltage is 10VDC.

4.6.5 Electrical Description

Refer to machine schematic P-146665-369.

Incoming power is connected to the CB-1 circuit breaker. The CB-1 feeds the control transformer, interface box line filter, and solid-state relays for the appropriate 120 VAC devices. The control transformer provides 24 VDC power. The interface box line filter feeds the power supply, which provides +5, +15, -15 and +12 VDC to the control.

4.7 HIGH-PRESSURE PUMP TEST ROUTINE

4.7.1 General

The purpose of the H.P. pump test routine is to check the function of the H.P. pump by monitoring the pressure output of the pump. The control monitors the LS6 switch for this purpose. LS6 setting is 1.75 psi. When operating properly, the LS6 switch would be closed when the pump is ON and be open when the pump is OFF.

The control monitors the LS6 switch by reading voltages across the switch. A "high" reading (5 VDC) is interpreted as switch OPEN, which should be the case with the H.P. pump OFF. A "low" reading (0 VDC) is interpreted as switch CLOSED, which indicates the switch is reading a pressure greater than the switch set-point of 1.75 psi.

The H.P. pump is checked for proper operation in both the Sterile cycle and the Diagnostic cycle.

In the Sterile cycle, the H.P. pump is checked at three points in the cycle. The first check is just after the seal is inflated. The control checks LS6, and since the H.P. pump is OFF at this point, the switch should be open. The second check takes place at the beginning of the Exposure phase. Since the H.P. pump has been running at this point, LS6 should be closed. The third check takes place at the beginning of the fourth Rinse drain phase. The H.P. pump is turned OFF briefly and the LS6 switch should open at that point.

In the Diagnostic cycle, the H.P. pump is checked at one point in the cycle. At the beginning of the drain phase, the H.P. pump is turned OFF and the control checks LS6 for an open condition. If the test passes, the H.P. pump is turned ON and the control checks the LS6 for a closed condition.

The Sterile cycle tests are the same in Model 89 and Model 90 units and the Model 99 units; however, the method of calculating a pass/fail condition during a Diagnostic cycle differs. These differences are described later in this section.

4.7.2 Diagnostic H.P. Pump Test – Model 89 and Model 90 Units

Note that current program chips in Model 89 and Model 90 units are to be as follows. This description applies to units equipped with these program chips only.

Program	Chip Revision	Language
500159	Rev D or higher	U.S.
500160	Rev B or higher	Australian
500161	Rev B or higher	U.K.
500165	Rev B or higher	Italian
500167	Rev B or higher	German
500168	Rev B or higher	Spanish
500169	Rev B or higher	French

- **Pump OFF Test**

When checking for H.P. pump OFF, the software has a "loop" where it checks the status of LS6 switch about every two seconds. The control has to see five separate LS6 OPEN readings in less than ten seconds for the test to pass. If LS6 CLOSED readings occur during this test, the control continues looping checks until the required five OPEN readings are read (i.e., there is no "penalty" if CLOSED readings occur during the test). Since the software checks the switch readings very quickly, the H.P. pump OFF test normally takes only a few seconds. Note that the main function of the H.P. pump OFF test is to verify that the LS6 switch has not failed in the CLOSED position.

- **Pump ON Test**

Only if the pump OFF test has passed will the software continue with the pump ON test. At this point, the H.P. pump turns back ON and the control monitors the voltage across LS6. During this test, a "low" reading (0 VDC) is interpreted as switch CLOSED and indicates that the switch is responding properly to a pump ON condition. Again, the software goes through a routine of checking the LS6 switch, this time for CLOSED readings (0 VDC); however, the pump ON routine differs from the pump OFF routine. The control must see a minimum of six separate CLOSED readings (0 VDC), and additionally the software includes in the calculations any OPEN readings (5 VDC) that were found during the test. This routine is intended to assure the pump is producing a consistent output pressure, and therefore is the more difficult of the two tests to pass.

- **Diagnostic Variables**

The Diagnostic Cycle variables HP, HPC and HPF that are obtained after running a diagnostic cycle indicates the operation of the software during the high-pressure pump test routine:

HPF – This number indicates success or failure of the test: 0 = failure during pump OFF routine; 1 = failure during pump ON routine; 2 = successful test.

HP – This number indicates the number of times the LS6 switch was read OPEN during a given test. The value of HP depends on the success or failure of the HP Pump test overall. If HPF = 0, HP will report the number of times LS6 was read OPEN while in the pump OFF phase of the test. If HPF = 1 or 2, HP will report the number of times LS6 was read OPEN while in the pump ON phase of the test.

NOTE: If the unit passes the pump OFF phase of the test, the HP values for the pump OFF phase are not saved, only the values for the pump ON phase are retained.

HPC – This number indicates the number of times the control attempted to read the LS6 switch during each of the two tests.

Typical best-case readings are: HP=2, HPC=10 and HPF=2. As long as HPF=2, the unit has successfully passed the HP portion of the diagnostic test. However, if HP is in the double digits (e.g., HP=12, HPC=20 and HPF=2), it would indicate that the unit is still acceptable, but is not working at optimum and should have the pump and LS6 checked.

If HPF=0 is reported, LS6 should be evaluated for proper operation as that is the most likely component to cause this fault.

If HPF=1 is reported, the pump, LS6, and proper use of trays/adapters should all be evaluated.

NOTE: HP, HPC, and HPF are saved for diagnostic cycles only and do not apply to sterile processing cycles.

4.7.3 Diagnostic HP Pump Test– Model 99 Units

The routine for checking pump ON and pump OFF is simplified compared to the Model 89and Model 90 units. The control looks at LS6 switch at the same point in the cycle; however, the criteria is that LS6 must be continuously open for a 2-second period during a H.P. pump OFF test, and must be continuously closed for a 2-second period during a H.P. pump ON test. Total time allowed by the control to see a pass/fail condition is ten seconds for the pump OFF test and 30 seconds for the pump ON test.

The Model 99 units do not use the HP, HPC, and HPF variables.

AUTOCAD DWG.

755716-365	1 SHEET OF 1

QUANTITY				PART NUMBER	ITEM NO.	PART NAME	DESCRIPTION, MATERIAL	REV NO	REVISION DATE
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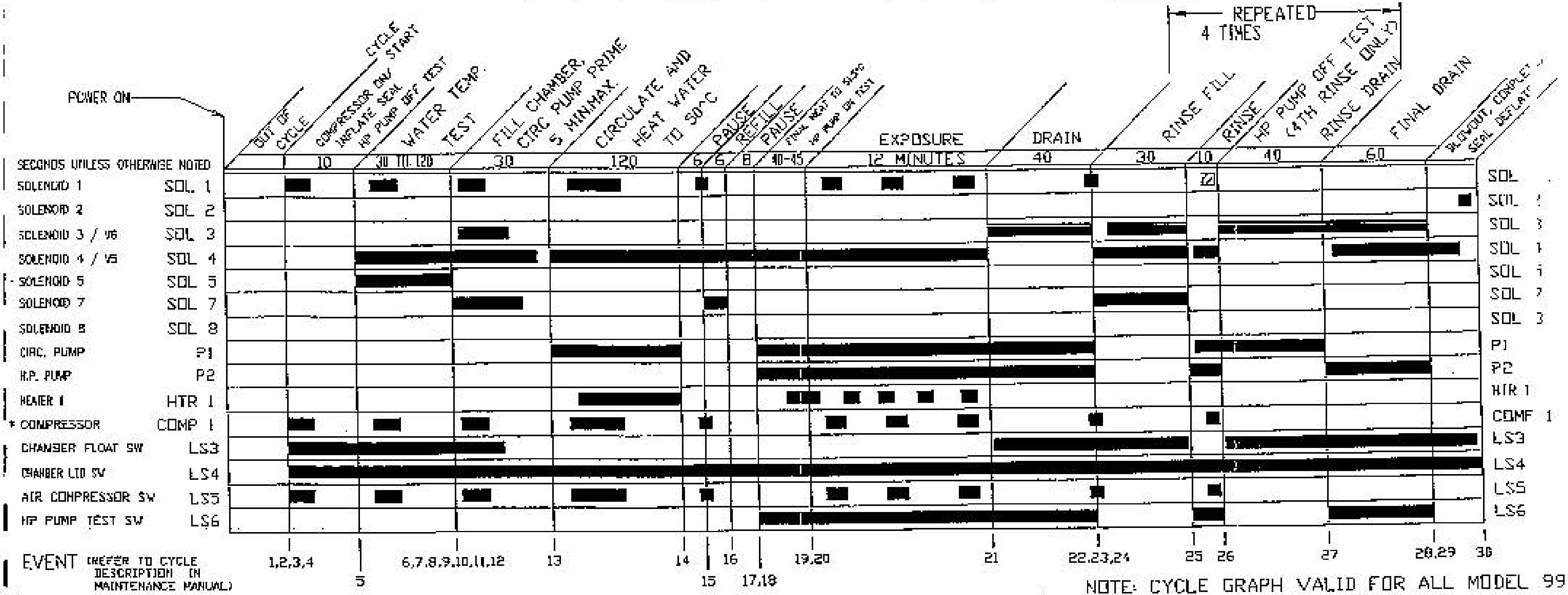
POWER ON
REPEATED 4 TIMES
OUT OF CYCLE
CYCLE START
COMPRESSOR ON/ INFLATE SEAL HP PUMP OFF TEST
WATER TEMP. TEST
FILL CHAMBER, CIRC PUMP PRIME 5 MIN.MAX.
CIRCULATE AND HEAT WATER TO 50°C
PAUSE
REFILL
PAUSE
FINAL HEAT TO 51.5°C
HP PUMP ON TEST
EXPOSURE
DRAIN
RINSE FILL
RINSE
HP PUMP OFF TEST (4TH RINSE ONLY)
RINSE DRAIN
FINAL DRAIN
BLOWOUT, COMPLETE, SEAL DEFLATE
SECONDS UNLESS OTHERWISE NOTED
10
30 TIL 120
30
120
6
6
8
40-45
12 MINUTES
40
30
10
40
60
SOLENOID 1 SOL 1
SOLENOID 2 SOL 2
SOLENOID 3 / V6 SOL 3
SOLENOID 4 / V5 SOL 4
SOLENOID 5 SOL 5
SOLENOID 7 SOL 7
SOLENOID 8 SOL 8
CIRC. PUMP P1
H.P. PUMP P2
HEATER 1 HTR 1
* COMPRESSOR COMP 1
CHAMBER FLOAT SW LS3
CHAMBER LID SW LS4
AIR COMPRESSOR SW LS5
HP PUMP TEST SW LS6
SOL 1
SOL 2
SOL 3
SOL 4
SOL 5
SOL 7
SOL 8
P1
P2
HTR 1
COMP 1
LS3
LS4
LS5
LS6
EVENT (REFER TO CYCLE DESCRIPTION IN MAINTENANCE MANUAL)
1,2,3,4
5
6,7,8,9,10,11,12
13
14
15
16
17,18
19,20
21
22,23,24
25
26
27
28,29
30

NOTE: CYCLE GRAPH VALID FOR ALL MODEL 99 PROCESSORS, AND MODEL 89 AND 90 UNITS WITH THE FOLLOWING PROGRAM CHIPS

500159 REVISION D DOMESTIC ENGLISH
500160 REVISION D AUSTRALIAN
500161 REVISION B U.K.
500165 REVISION B ITALIAN
500167 REVISION B GERMAN
500168 REVISION B SPANISH
500169 REVISION B FRENCH

VALVE STATUS ▬ INDICATES ON

SWITCH STATUS ▬ INDICATES SWITCH CLOSURE

* ACTIVATION OF COMP 1 AND LS 5 SHOWN TYPICAL. COMP 1 WILL OPERATE WHENEVER PRESSURE DROPS BELOW LS5 SETTING.

TOLERANCE, STANDARD UNLESS OTHERWISE NOTED: FRACTIONAL +/-1/64 DECIMAL +/-.005 ANGULARITY+/-1° MACH.SURF. 125

NO.	DATE	ECN NUMBER	NO.	DATE	ECN NUMBER
3	11-20-00	SVC00-70			
2	10-29-99	SVC99-105			
1	04-07-97	SVC97-30			
0	04-11-96				
REVISIONS			REVISIONS		

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DRN.	DMG	CKD.	SIR	DES.	GJK	MFG.		ENG.	
DATE 04/11/96		DATE 04/11/96		DATE 04/11/96		DATE		DATE	

TITLE
STERIS SYSTEM 1
CYCLE GRAPH

FIRST MADE FOR:

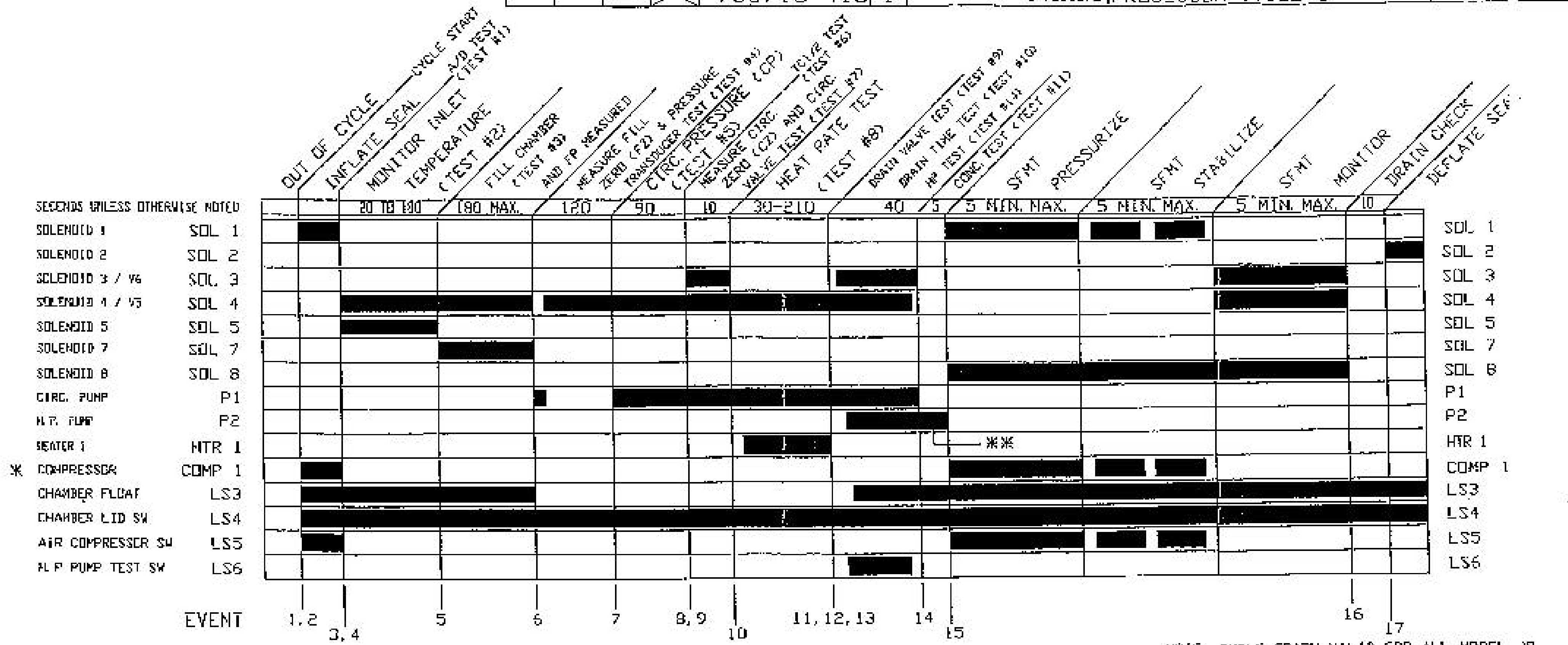
DWG. NO. 755716-365 1 SHEET OF 1

X

755716-415 | 1 SHEET OF 1

AUTOCAD DWG.

QUANTITY	PART NUMBER	ITEM NO.	PART NAME	DESCRIPTION, MATERIAL	REV NO.	REVISION DATE
	755716-415	1	STERIS SYSTEM ENDOSCOPE	PROCESSOR CYCLE GRAPH	1	11-20-00



ACTIVATION OF COMP 1 AND LS 5 SHOWN TYPICAL.
COMP 1 WILL OPERATE WHENEVER PRESSURE DROPS
BELOW LS5 SETTING.

*HP PUMP P2 ON DURING CONC TEST ON MODEL 99
UNITS ONLY.

VALVE STATUS ■	INDICATES ON
SWITCH STATUS ■	INDICATES SWITCH CLOSURE

NOTE: CYCLE GRAPH VALID FOR ALL MODEL 99
PROCESSORS, AND MODEL 89 AND 90 UNITS
WITH THE FOLOWING PROGRAM CHIPS:

500159	REVISION	B	DOMESTIC ENGLISH
500160	REVISION	B	AUSTRALIAN
500161	REVISION	B	U.K.
500165	REVISION	B	ITALIAN
500167	REVISION	B	GERMAN
500168	REVISION	B	SPANISH
500169	REVISION	B	FRENCH

LERANCE STANDARD
LESS OTHERWISE NOTED

FRACTIONAL +/-1/64 DECIMAL +/-.005
ANGULARITY+/-1° MACH. SURF. 125

1	11-20-00	SVC00-70				
0	10-01-96	SVC96-79				
	DATE	E.C.A. NUMBER	NO.	DATE	E.C.A. NUMBER	
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DWL.	RDE	CKD.	HR	ENG.	D.M.	MFG.		Q.A.	
DATE 10/01/96		DATE 10/01/96		DATE 10/01/96		DATE		DATE	

TITLE
STERIS SYSTEM 1
CYCLE GRAPH, DIAGNOSTIC

FIRST MADE FOR:

DWG. NO. 755716-415 | 1 SHEET OF 1

X

755716-364 | 1 SHEET OF 1

AUTOCAD DWG.

QUANTITY				PART NUMBER	ITEM NO.	PART NAME	DESCRIPTION, MATERIAL	REV NO	REVISION DATE
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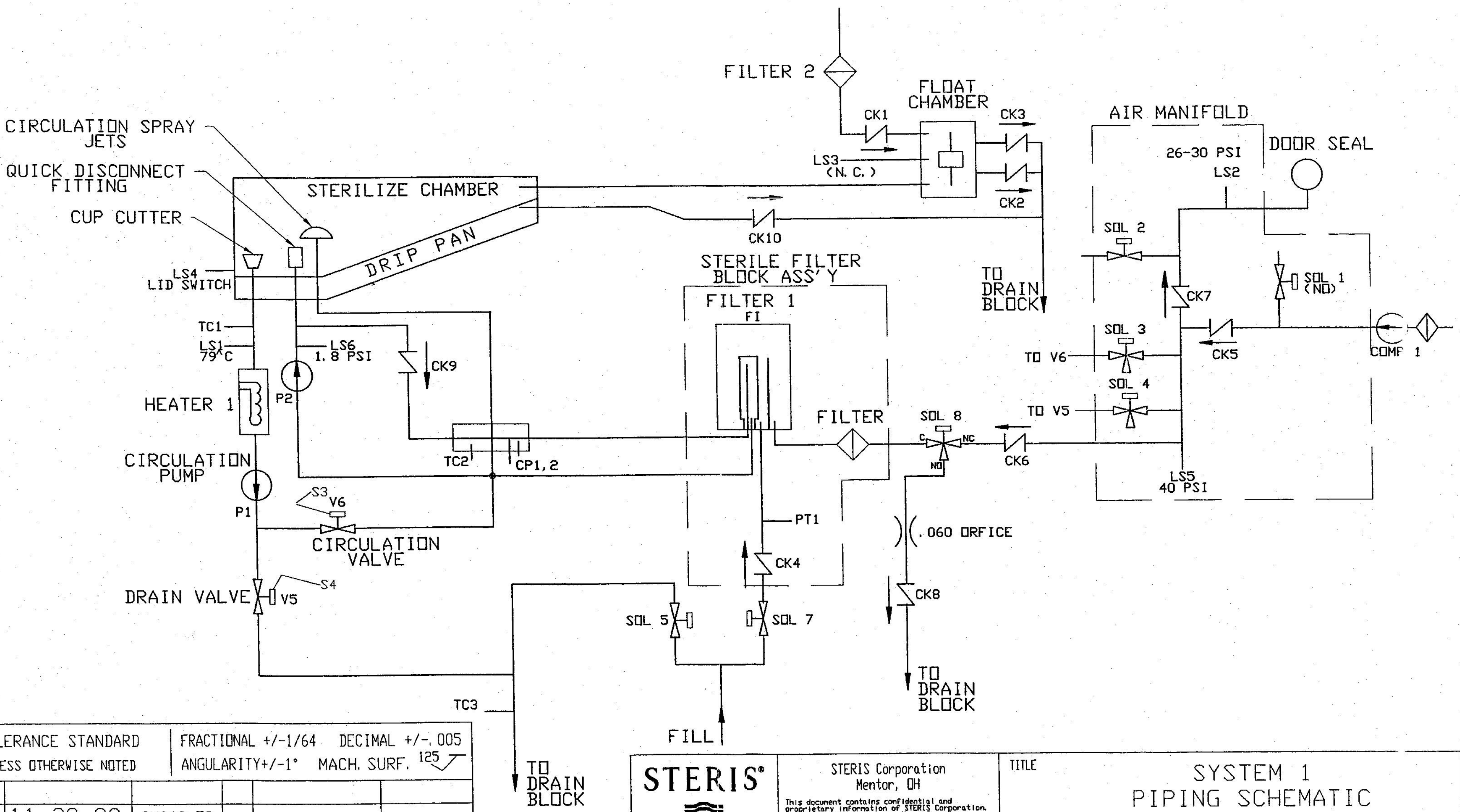
FILTER 2
FLOAT CHAMBER
CK1
CK3
CK2
LS3 (N. C.)
AIR MANIFOLD
26-30 PSI
LS2
DOOR SEAL
CIRCULATION SPRAY JETS
QUICK DISCONNECT FITTING
CUP CUTTER
STERILIZE CHAMBER
DRIP PAN
LS4 LID SWITCH
CK10
TO DRAIN BLOCK
SOL 2
CK7
SOL 1 (NO)
STERILE FILTER BLOCK ASS'Y
FILTER 1
FI
TC1
LS1 79°C
LS6 1.8 PSI
CK9
HEATER 1
P2
SOL 3
TO V6
CK5
COMP 1
SOL 4
TO V5
FILTER
SOL 8
C
NC
NO
CK6
LS5 40 PSI
CIRCULATION PUMP
TC2
CP1, 2
P1
S3
V6
CIRCULATION VALVE
PT1
.060 ORFICE
CK4
DRAIN VALVE
S4
V5
CK8
SOL 5
SOL 7
TO DRAIN BLOCK
TC3
FILL
TO DRAIN BLOCK

TOLERANCE STANDARD UNLESS OTHERWISE NOTED | FRACTIONAL +/-1/64 DECIMAL +/-.005 ANGULARITY+/-1° MACH. SURF. 125

NO.	DATE	E.C.A. NUMBER	NO.	DATE	E.C.A. NUMBER
2	11-20-00	SVC00-70			
1	09/16/96	SVC96-81			
0	04/11/96				
REVISIONS			REVISIONS		

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DWN. DHC	CKD. HR	ENG. GJK	MFG.	C.D.
DATE 04/11/96	DATE 04/11/96	DATE 04/11/96	DATE	DATE

TITLE
SYSTEM 1
PIPING SCHEMATIC

FIRST MADE FOR:

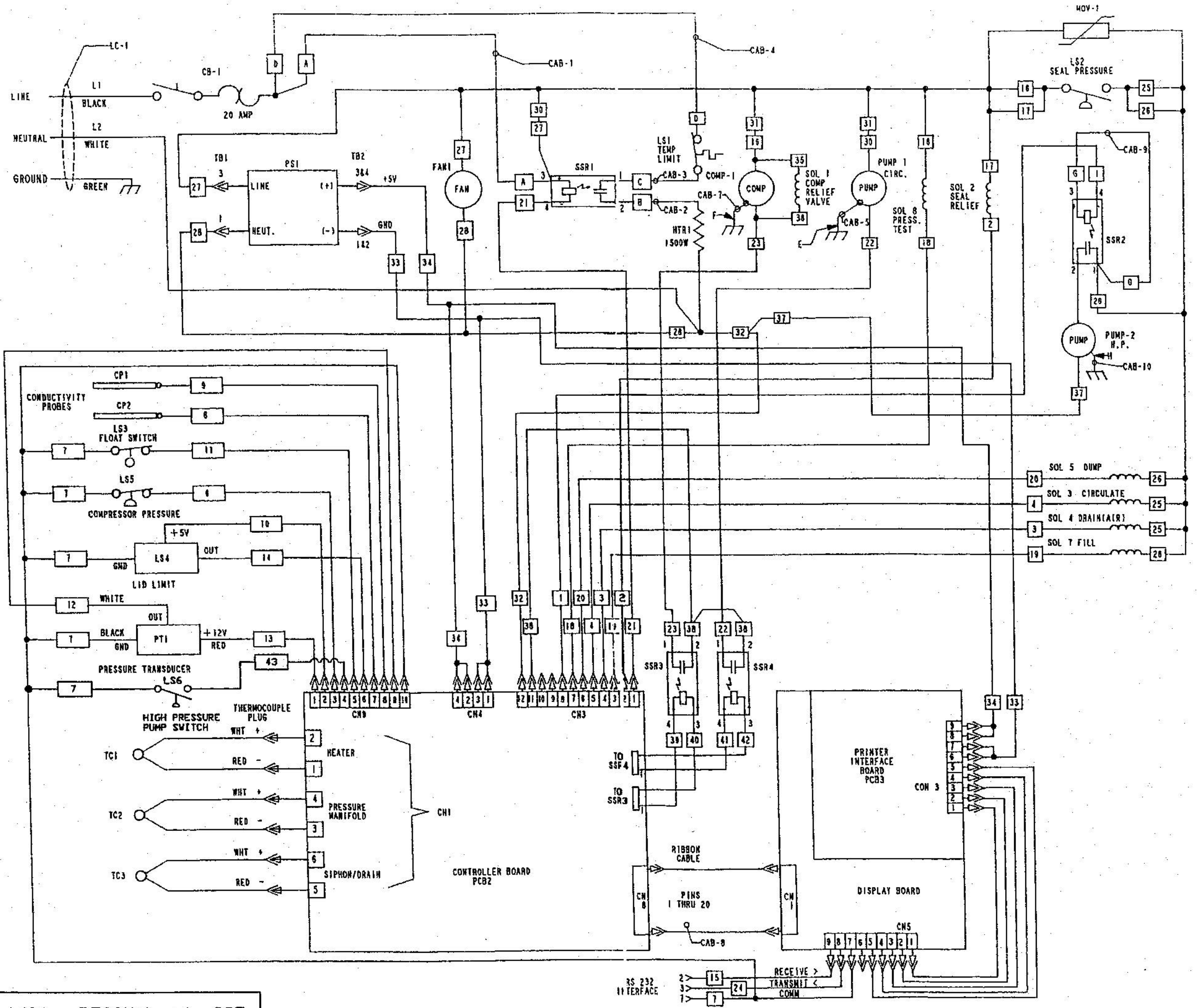
DWG. NO. 755716-364 | 1 SHEET OF 1

300018

755717-157 | 1 SHEET OF 1

AUTOCAD DWG.

QUANTITY				PART NUMBER	ITEM NO.	PART NAME	DESCRIPTION, MATERIAL	REV NO	REVISION DATE
			☒	755717-157	1	SCHEMATIC		0	01-30-02


LC-1
LINE
L1
BLACK
NEUTRAL
L2
WHITE
GROUND
GREEN
CB-1
20 AMP
D
A
CAB-1
CAB-4
TB1
PS1
TB2
LINE
NEUT.
(+)
(-)
3&4
+5V
GND
1&2
FAN1
FAN
SSR1
CAB-3
CAB-2
LS1 TEMP LIMIT
COMP-1
CAB-7
COMP
HTR1 1500W
SOL 1 COMP RELIEF VALVE
PUMP 1 CIRC.
PUMP
CAB-5
SOL 8 PRESS. TEST
SOL 2 SEAL RELIEF
MOV-1
LS2 SEAL PRESSURE
CAB-9
SSR2
PUMP-2 H.P.
CAB-10
SOL 5 DUMP
SOL 3 CIRCULATE
SOL 4 DRAIN(AIR)
SOL 7 FILL
CONDUCTIVITY PROBES
CP1
CP2
LS3 FLOAT SWITCH
LS5
COMPRESSOR PRESSURE
LS4
+5V
OUT
GND
LID LIMIT
WHITE
BLACK
PT1
+12V
RED
PRESSURE TRANSDUCER
LS6
HIGH PRESSURE PUMP SWITCH
THERMOCOUPLE PLUG
WHT +
RED -
TC1
TC2
TC3
HEATER
PRESSURE MANIFOLD
SIPHON/DRAIN
CH1
CN9
CN4
CN3
CONTROLLER BOARD PCB2
SSR3
SSR4
TO SSF4
TO SSR3
RIBBON CABLE
PINS 1 THRU 20
CN 8
CN 1
CAB-8
PRINTER INTERFACE BOARD PCB3
CON 3
DISPLAY BOARD
CN5
RS 232 INTERFACE
RECEIVE >
TRANSMIT <
COMM

LERANCE STANDARD | FRACTIONAL +/-1/64 DECIMAL +/-.005
ESS OTHERWISE NOTED | ANGULARITY+/-1° MACH. SURF. 125

01-30-02	MFEF02-03			
DATE	E.C.A NUMBER	NO.	DATE	E.C.A. NUMBER
REVISIONS			REVISIONS	

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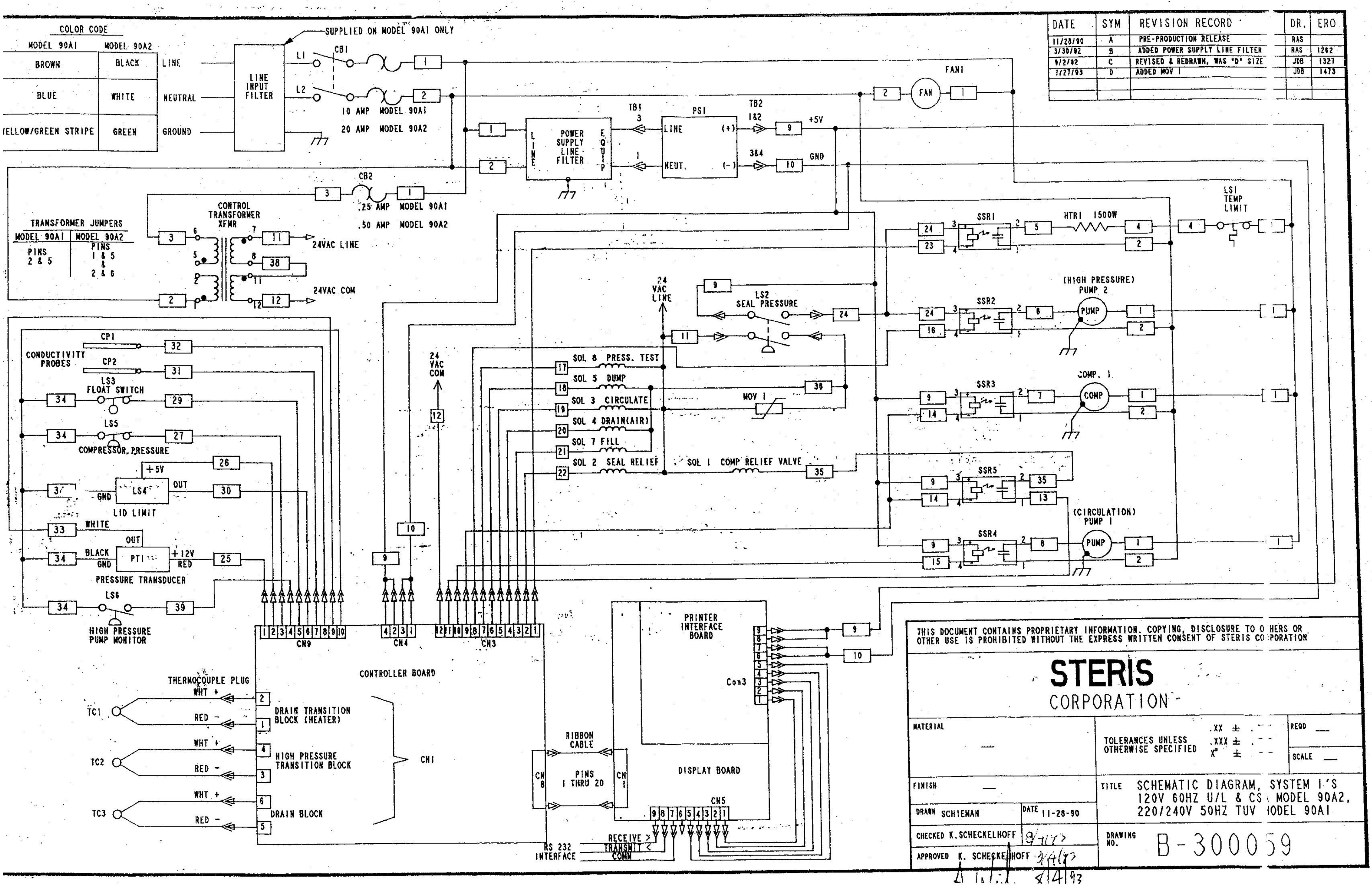
DWN. JAW	CKD. J. BEAN	ENG. MF	MFG.	C.D.
DATE 01-30-02	DATE 01-30-02	DATE 01-30-02	DATE	DATE

TITLE SCHEMATIC DIAGRAM,
SYSTEM 1, MODEL 89A1

FIRST MADE FOR:

DWG. NO. 755717-157 | 1 SHEET OF 1


SUPPLIED ON MODEL 90A1 ONLY
LINE
NEUTRAL
GROUND
LINE INPUT FILTER
L1
L2
CB1
10 AMP MODEL 90A1
20 AMP MODEL 90A2
CB2
.25 AMP MODEL 90A1
.50 AMP MODEL 90A2
POWER SUPPLY LINE FILTER
LINE
EQUIP
TB1
3
1
PS1
LINE
NEUT.
(+)
(-)
TB2
1&2
3&4
+5V
GND
FAN1
FAN
CONTROL TRANSFORMER XFMR
24VAC LINE
24VAC COM
LS1 TEMP LIMIT
SSR1
HTR1 1500W
(HIGH PRESSURE) PUMP 2
SSR2
PUMP
COMP. 1
SSR3
COMP
SSR5
(CIRCULATION) PUMP 1
SSR4
24 VAC LINE
LS2 SEAL PRESSURE
24 VAC COM
SOL 8 PRESS. TEST
SOL 5 DUMP
SOL 3 CIRCULATE
SOL 4 DRAIN(AIR)
SOL 7 FILL
SOL 2 SEAL RELIEF
MOV 1
SOL 1 COMP RELIEF VALVE
CONDUCTIVITY PROBES
CP1
CP2
LS3 FLOAT SWITCH
LS5
COMPRESSOR PRESSURE
+5V
OUT
LS4
GND
LID LIMIT
WHITE
BLACK
GND
PT1
+12V
RED
PRESSURE TRANSDUCER
LS6
HIGH PRESSURE PUMP MONITOR
CN9
CN4
CN3
CONTROLLER BOARD
THERMOCOUPLE PLUG
TC1
TC2
TC3
WHT +
RED -
DRAIN TRANSITION BLOCK (HEATER)
HIGH PRESSURE TRANSITION BLOCK
DRAIN BLOCK
CN1
RIBBON CABLE
CN 8
PINS 1 THRU 20
CN 1
PRINTER INTERFACE BOARD
Con3
DISPLAY BOARD
CN5
RS 232 INTERFACE
RECEIVE >
TRANSMIT <
COMM

COLOR CODE

MODEL 90A1	MODEL 90A2	
BROWN	BLACK	LINE
BLUE	WHITE	NEUTRAL
YELLOW/GREEN STRIPE	GREEN	GROUND

TRANSFORMER JUMPERS

MODEL 90A1	MODEL 90A2
PINS 2 & 5	PINS 1 & 5 & 2 & 6

DATE	SYM	REVISION RECORD	DR.	ERO
11/28/90	A	PRE-PRODUCTION RELEASE	RAS	
3/30/92	B	ADDED POWER SUPPLY LINE FILTER	RAS	1262
9/2/92	C	REVISED & REDRAWN, WAS 'D' SIZE	JDB	1327
7/27/93	D	ADDED MOV 1	JDB	1473

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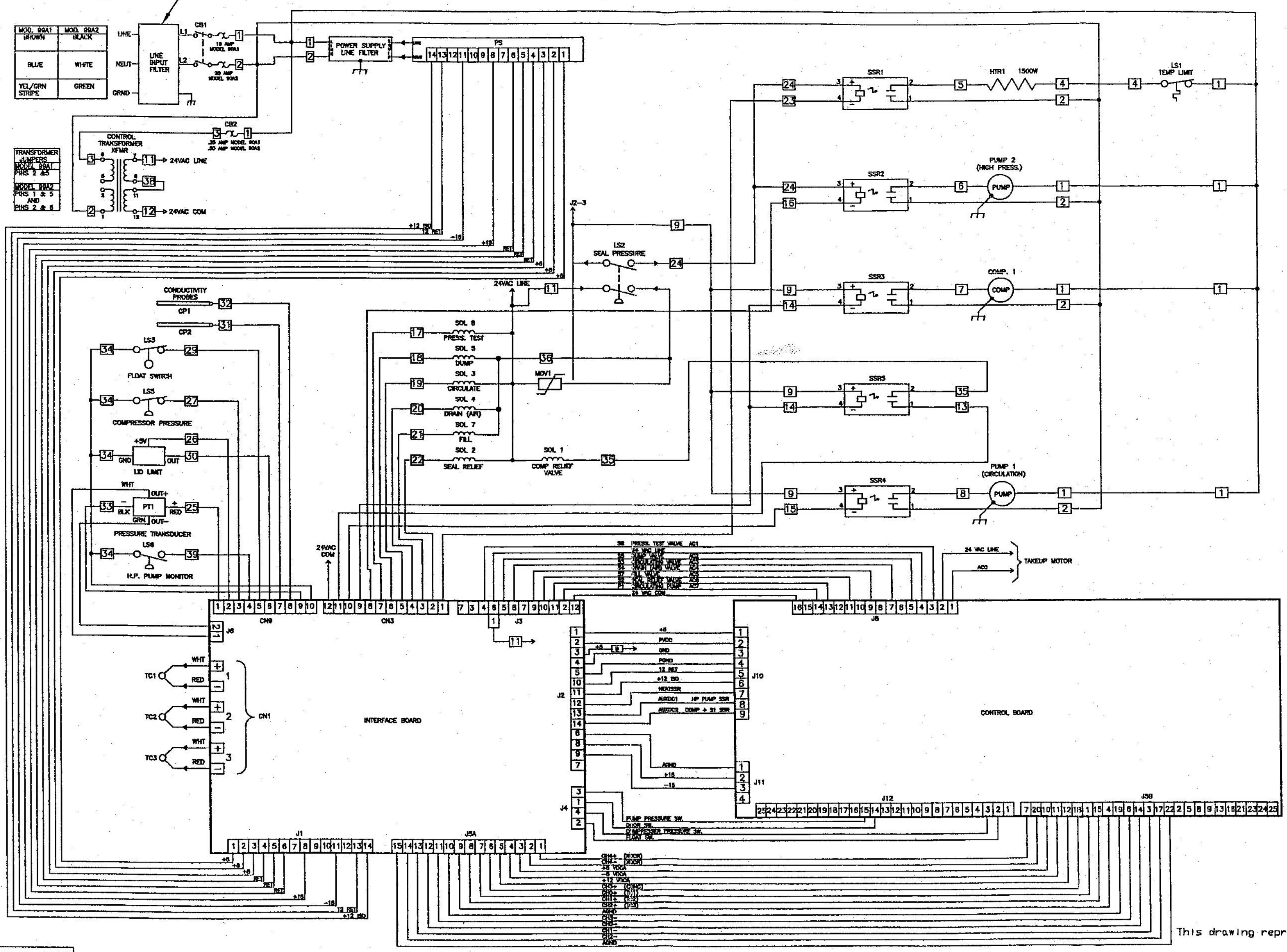
MATERIAL —
TOLERANCES UNLESS OTHERWISE SPECIFIED .XX ± .-- .XXX ± .-- X° ± --
REQD —
SCALE —
FINISH —
TITLE SCHEMATIC DIAGRAM, SYSTEM 1'S 120V 60HZ U/L & CS MODEL 90A2, 220/240V 50HZ TUV MODEL 90A1
DRAWN SCHIEMAN DATE 11-28-90
CHECKED K.SCHECKELHOFF 9/7/92
APPROVED K. SCHECKELHOFF 9/4/92
DRAWING NO. B-300059
8/4/93

146665-369 1 SHEET OF 1

QUANTITY				PART NUMBER	ITEM NO.	PART NAME	DESCRIPTION, MATERIAL	REV NO.	REVISION DATE
			☒	146665--369	1	MACHINE SCHEMATIC		0	10-14-99


SUPPLIED ON MODEL 90A1 ONLY
MOD. 90A1 BROWN
MOD. 90A2 BLACK
BLUE
WHITE
YEL/GRN STRIPE
GREEN
LINE
NEUT
GRND
LINE INPUT FILTER
CB1
10 AMP MODEL 90A1
20 AMP MODEL 90A2
CB2
.25 AMP MODEL 90A1
.50 AMP MODEL 90A2
POWER SUPPLY LINE FILTER
PS
TRANSFORMER JUMPERS MODEL 90A1 PINS 2 & 3
MODEL 90A2 PINS 1 & 5 AND PINS 2 & 6
CONTROL TRANSFORMER XFMR
24VAC LINE
24VAC COM
+12 ISO
12 RET
-15
+15
RET
+5
SSR1
HTR1 1500W
LS1 TEMP LIMIT
SSR2
PUMP 2 (HIGH PRESS.)
PUMP
SSR3
COMP. 1
COMP
SSR5
SSR4
PUMP 1 (CIRCULATION)
J2-3
LS2 SEAL PRESSURE
24VAC LINE
CONDUCTIVITY PROBES
CP1
CP2
LS3
FLOAT SWITCH
LS5
COMPRESSOR PRESSURE
+5V
GND
OUT
LID LIMIT
WHT
OUT+
OUT-
BLK
GRN
RED
PT1
PRESSURE TRANSDUCER
LS6
H.P. PUMP MONITOR
SOL 8 PRESS. TEST
SOL 5 DUMP
SOL 3 CIRCULATE
SOL 4 DRAIN (AIR)
SOL 7 FILL
SOL 2 SEAL RELIEF
MOV1
SOL 1 COMP RELIEF VALVE
24VAC COM
S8 PRESSL TEST VALVE AC1
24 VAC LINE
S5 DUMP VALVE
S3 CIRCULATING VALVE
S4 DRAIN (AIR) VALVE
S7 FILL VALVE
S2 SEAL RELIEF VALVE
P1 CIRCULATING PUMP AC7
24 VAC COM
24 VAC LINE
ACO
TAKEUP MOTOR
CN9
CN3
J3
J8
J6
TC1
TC2
TC3
CN1
INTERFACE BOARD
CONTROL BOARD
J2
+5
PVCC
GND
PGND
12 RET
+12 ISO
HEATSSR
AUXDC1 HP PUMP SSR
AUXDC2 COMP + S1 SSR
J10
AGND
+15
-15
J11
J4
PUMP PRESSURE SW.
DOOR SW.
COMPRESSOR PRESSURE SW.
FLOAT SW.
J12
J5B
J1
J5A
CH4+ (XDCR)
CH4- (XDCR)
+5 VDCA
-5 VDCA
+12 VDCA
CH3+ (COND)
CH0+ (T/1)
CH1+ (T/2)
CH2+ (T/3)
AGND
CH3-
CH0-
CH1-
CH2-
AGND

This drawing represents P146665 369 Rev. 10-14-99.

ANCE STANDARD OTHERWISE NOTED	FRACTIONAL +/-1/64 DECIMAL +/-.005 ANGULARITY+/-1° MACH. SURF. 125

REV. DATE	E.C.O. NUMBER	NO.	DATE	E.C.O. NUMBER
0-14-99	990213			

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Mentor, OH

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TITLE MACHINE S HEMATIC (SYSTEM -REX)

FIRST MADE FOR:

DWN. JJB	CKD. E.Z.	ENG. NJP	MFG. VGM	C.S.
DATE 10-08-99	DATE 10-14-99	DATE 10-14-99	DATE 10-14-99	DATE

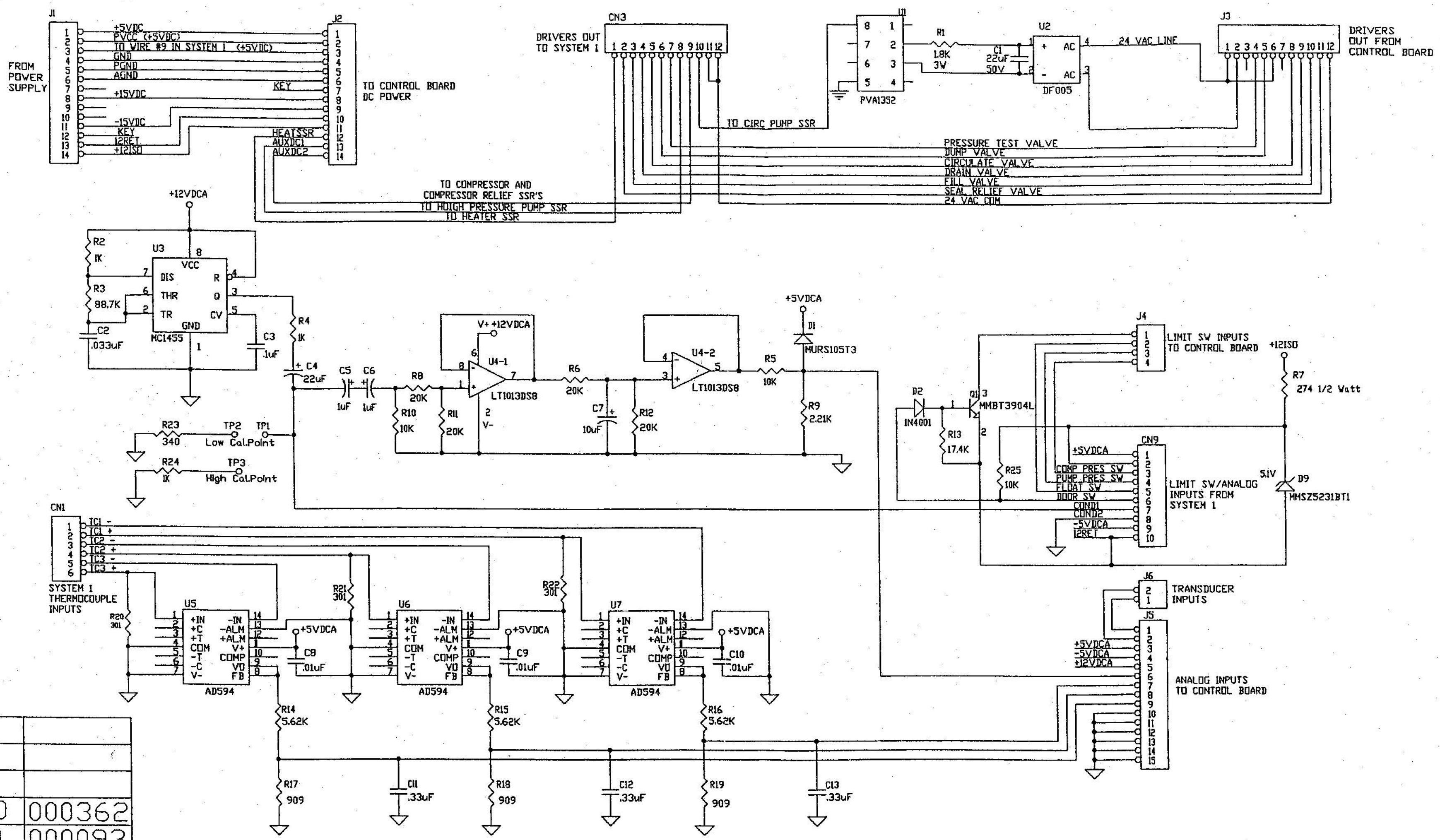
DWG. NO. 146665- 69 1 SHEET OF 1

AUTOCAD DWG.

93915-200 | 3 SHEET OF 3

AUTOCAD DWG.

QUANTITY			PART NUMBER	ITEM NO.	PART NAME	DESCRIPTION, MATERIAL	REV NO	REVISION DATE
		XXX	93915-200	1	ASSEMBLY,	INTERFACE BOARD	9	12-28-00


J1
FROM POWER SUPPLY
+5VDC
PVCC (+5VDC)
TO WIRE #9 IN SYSTEM 1 (+5VDC)
GND
PGND
AGND
+15VDC
-15VDC
KEY
12RET
+12ISO
J2
KEY
HEATSSR
AUXDC1
AUXDC2
TO CONTROL BOARD DC POWER
TO COMPRESSOR AND COMPRESSOR RELIEF SSR'S
TO HOIGH PRESSURE PUMP SSR
TO HEATER SSR
CN3
DRIVERS OUT TO SYSTEM 1
TO CIRC PUMP SSR
U1
PVA1352
R1 1.8K 3W
C1 22uF 50V
U2
AC
AC
DF005
24 VAC LINE
J3
DRIVERS OUT FROM CONTROL BOARD
PRESSURE TEST VALVE
DUMP VALVE
CIRCULATE VALVE
DRAIN VALVE
FILL VALVE
SEAL RELIEF VALVE
24 VAC COM
+12VDCA
R2 1K
R3 88.7K
C2 .033uF
U3
VCC
DIS
THR
TR
R
Q
CV
GND
MC1455
C3 .1uF
R4 1K
C4 22uF
C5 1uF
C6 1uF
R8 20K
R10 10K
R11 20K
V+ +12VDCA
U4-1
LT1013DS8
V-
R6 20K
C7 10uF
R12 20K
U4-2
LT1013DS8
R5 10K
+5VDCA
D1
MURS105T3
R9 2.21K
R23 340
TP2
TP1
Low Cal.Point
R24 1K
TP3
High Cal.Point
D2
1N4001
R13 17.4K
Q1
MMBT3904L
R25 10K
J4
LIMIT SW INPUTS TO CONTROL BOARD
+12ISO
R7 274 1/2 Watt
CN9
+5VDCA
COMP PRES SW
PUMP PRES SW
FLOAT SW
DOOR SW
COND1
COND2
-5VDCA
12RET
LIMIT SW/ANALOG INPUTS FROM SYSTEM 1
5.1V
D9
MMSZ5231BT1
CN1
TC1 -
TC1 +
TC2 -
TC2 +
TC3 -
TC3 +
SYSTEM 1 THERMOCOUPLE INPUTS
R20 301
R21 301
R22 301
U5
U6
U7
+IN
+C
+T
COM
-T
-C
V-
-IN
-ALM
+ALM
V+
COMP
VO
FB
AD594
+5VDCA
C8 .01uF
C9 .01uF
C10 .01uF
R14 5.62K
R15 5.62K
R16 5.62K
R17 909
R18 909
R19 909
C11 .33uF
C12 .33uF
C13 .33uF
J6
TRANSDUCER INPUTS
J5
+5VDCA
-5VDCA
+12VDCA
ANALOG INPUTS TO CONTROL BOARD

12-28-00	000362
04-10-00	000093

ILERANCE STANDARD
LESS OTHERWISE NOTED

FRACTIONAL +/-1/64 DECIMAL +/-.005
ANGULARITY+/-1° MACH.SURF. 125

DATE	E.C.A. NUMBER	NO.	DATE	E.C.A. NUMBER
3-22-99	RA 133	7	04-06-00	000105
02-16-99	RA 132	6	07-12-99	RA 140
01-27-99	RA 130	5	04-29-99	RA 138
11-12-98	PER 39	4	03-25-99	RA 136

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DWN. SINGER	CKD. JS	ENG. MJP	MFG. JPC	C.D.
DATE 10-12-98	DATE 11-12-98	DATE 11-12-98	DATE 11-16-98	DATE

TITLE ASSEMBLY, INTERFACE BOARD

FIRST MADE FOR:

DWG. NO. 93915-200

3 SHEET OF 3

Section 5: Service Mode Procedures

5.1 GENERAL

Service Mode operation differs significantly between the Model 89, Model 90 units and the Model 99 units. As such, service mode access and operation for each unit type will be described separately.

The sections are complete with respect to unit type, and it is not necessary to refer to one section when working on the other type.

5.2 MODEL 89 AND MODEL 90 UNITS

Access to the Service Mode on these units is through the use of the STERIS hand terminal (Part Number 500102). In addition to the hand terminal, the following components are needed:

- 500103: Modular Cable
- 500104: Modular Adapter
- 500105: Power Supply
- 300080: Communication Link (not required for Model 89 units)

5.2.1 General

This procedure describes the general method of communicating with Model 89 and Model 90 units. It gives command syntax words, memory maps, and input/output register locations and data-scaling. It is to be used to test and troubleshoot SYSTEM 1® Sterile Processing System, Model 89 and Model 90.

CAUTION: When using this procedure to command the SYSTEM 1, care must be exercised in typing commands: one 1500 watt heating element, three line connected AC motors, and seven solenoid valves are controlled by the unit. These may be turned on/off during command typing. Machine damage or personal injury could result from careless errors in command entry. All commands should be double checked prior to entry.

5.2.2 Connection Procedure

- On Model 89 units, connect the 25-pin "D"-type connector to the socket on the back of the SYSTEM 1.
- On Model 90 units, plug communication link into the 25-pin "D" type on the connector on the adapter. Attach other end of the link to printer board through 1" (25.4 mm) diameter access hole in printer board cover (plastic shroud).

5.2.3 Hand Terminal Set up

Prior to communicating with the SYSTEM 1, the hand terminal must be properly programmed. This is required only once as the hand terminal will retain these parameters.

5.2.3.1 Set Hand Control Parameters

Press [CONTROL, SHIFT, F1] simultaneously.

[BAUD 4800]

[DATA BITS = 8]

[PARITY = NONE]

[STOP BITS = 1]

[REPEAT = MEDIUM]

[ENABLE KEY CLICK]

[DISABLE KNP FUNCTION]

[ENABLE CURSOR]

[ENABLE CURSOR BLINK]

[DISABLE XON/XOFF]

[DISABLE HANDSHAKE]

[DISABLE ECHO]

[ESCAPE MODE = ANSI]

[CR/LF = NORMAL]

[ENABLE TEST]

[SHIFT LOCK DISABLE]

[SCROLL ON 80]

[VIEWING ANGLE MAX]

[DISABLE BREAK COMMAND]

[BACKLIGHT ON]

This completes basic communicator set up. The communicator's function keys can be programmed to save time. Refer to Section 5.2.3.2, below for Function Key Set Up procedure.

5.2.3.2 Function Key Setup Procedure

Using the function keys of TT8045 Hand Terminal saves time and steps when servicing SYSTEM 1.

To program these keys, follow this procedure (or refer to Operation Instructions for Hand Terminal):

1. Enter programming mode by pressing CTRL, SHIFT and F2 keys simultaneously.

   The terminal displays the prompt:

   "PRESS FUNCTION KEY TO DEFINE"

2. Select function key to be programmed.

   The terminal will display the current programmed data for that key.

3. Press F1 key to select: Change Data.

   A cursor prompts for data entry. Enter data to be stored for the selected key. Refer to command data table, below.

4. Press the F2 key to save command data, and to advance to the next key to be programmed. Alternatively, press F5 key to save the data and exit the programming procedure.

   Terminal prompts: "ARE YOU SURE?"

   Select "YES" to complete.

   Example: Press CTRL, SHIFT and F2 simultaneously. Press F4 as the key to define. Press F1 key to change data. Enter the command "XBY(4002H)=" Press F2 to save and continue, or F5 to save and exit programming procedure.

Command Data Table

F1:	PRINTXBY	SHIFT+F1:	?XBY(0E000H)**
F2:	?XBY(4000h).AND.	SHIFT+F2:	?XBY(0E001H)**
F3:	XBY(4001H)=	SHIFT+F3:	?XBY(0E002H)**
F4:	XBY(4002H)=	SHIFT+F4:	?XBY(0E003H)**
F5:	FF*	SHIFT+F5:	?XBY(0E005H)**

* *Character Delete: To program this data, at step 3. select F4 key (NUM). "H" appears on the display. Enter characters "FF" as a number (hexadecimal).*

** *Shift + Function Keys: To program this column of data, press SHIFT key and FUNTION key simultaneously when prompt reads: "KEY TO DEFINE".*

5.2.4 Using the Hand Terminal

NOTE: Refer to the System Address and Memory Map as required.

System address and memory map.

FFFF- E008	Unused
E007- E000	A/D Converter
C002- C000	Port U4
BFFF- 8000	ROM
7FFF- 4003	Unused
4002- 4000	Port U5
3FFF- 2800	Unused
27FF- 2000	2K BATTERY BACKED-UP RAM, CLOCK/CALENDAR
1FFF- 0000	8K RAM

1. **To read any address in the system, use the following command:** PRINT XBY(XXXXH)<ENT>. **XXXX is the desired address in hexadecimal.**

   NOTE: If a letter (A through F) is the first digit of the address, then a "0" must precede it. The last character of a hexadecimal address must be an "H".

   To turn a component or components on or off, use the following format: XBY(YYYYH)=ZZZ. YYYY is the address (hexadecimal) to which the command will be executed. ZZZ is the decimal value that is being commanded to the address.

   NOTE: If a letter (A through F) is the first digit of the address, then a "0" must precede it. Observe caution while outputting commands to the system.

2. A/D Converter Address: 0E000H though 0E007H

Hexadecimal Address	Function	Scaling Factor
0E000H	Thermocouple #1 in drain transition block	1 count =0.5°C 0 count =room temp
0E001H	Thermocouple #2 in high pressure transition block	1 count =0.5°C 0 count =room temp
0E002H	Thermocouple #3 in drain block assembly	1 count=0.5°C 0 count=room temp
0E003H	Room temp. sensor on controller PCBD	1 count=0.5°C 0 count=0.0°C
0E004H	Concentration probe	1 count=0.0196 V
0E005H	Pressure transducer	1 count=0.39 psi 1 count=0.039 psi (in high gain mode)
0E006H	+5 VDC Supply	1 count=0.0195 V
0E007H	System Ground	1 count=0.0195 V

Examples:

Command	**Action**
PRINTXBY(0E003H)	Displays room temperature to hand terminal display in counts.
PRINTXBY(0E000H)	Displays temperature recorded by thermocouple #1.
PRINTXBY(0E006H)	Displays reading of pressure transducer in counts.

3. Port U4 C000H-C002H, U4A Address C000H, Binary 8 bits.

This address indicates the status of the control panel switches. A false (sometimes referred to as "zero") condition indicates the switch is closed (or last depressed).

Bit #	
0	Start switch
1	Cancel switch
2	Diagnostic switch
3	Unused
4	Filter selection switch #1
5	Filter selection switch #2
6	Unused
7	Unused

4. Port U4 C000H-C002H, U4B Address C001H, Binary 8 bits.

This address controls the panel indicators. A true condition indicates an indicator is illuminated.

Bit #	**Indicator Light**	**Decimal Value**
0	Ready	1
1	Complete	2
2	Cancel	4
3	Diagnostic	8
4	LT 1	16
5	LT 2	32
6	LT 3	64
7	LT 4	128

Examples:

Command	**Action**
XBY(0C001H)=0	Turns off all indicators
XBY(0C001H)=255	Turns on all indicators
XBY(0C001H)=1	Turns on ready indicator only
XBY(0C001H)=64	Turns on LT 3 only

5. Port U5 Address 4000H-4002H, U5 Address 4000H, Binary 8 bits.

This address indicates the status of the several system monitors.

Bit #	
0	Lid switch, true equals lid open condition
1	Float block switch, true equals chamber full
2	H.P. pump monitor pressure switch, false equals pressure sensed
3	SF housing, false equals pressure > 40 psi
4	Compressor control switch, false equals compressor OFF
5-7	unused

To manually acquire the state of a given input, it is necessary to mask out the other inputs. After this is done, a value of 0 indicates false, and a non-zero value indicates true. Below are examples on how to retrieve data on each input.

Examples:

Command	**Interpretation Of Results**
PRINTXBY(4000H).AND.1	0 = False = lid closed; 1 = True = lid open;
PRINTXBY(4000H).AND.2	0 = False = not full; 2 = True = full;
PRINTXBY(4000H).AND.4	0 = False = pressure sensed; 4 = True = pressure not sensed;
PRINTXBY(4000H).AND.8	0 = False = Xducer pressure > 40 psi; 8 = True = Xducer pressure < 40 psi;
PRINTXBY(4000H).AND.16	0 = False = compressor not running; 16 = True = compressor is running;

6. U5B Address 4001H, Binary 8 bits.

This address is the control register for most of the outputs from the controller PC board. A false condition turns on the respective device.

NOTE: This is a Write Only location. Any attempt to print a value [PRINTXBY(4001H)] from this location will result in ambiguous data being displayed.

Bit #	Component	Decimal Value
0	Seal release solenoid (SOL2)	1
1	Inlet fill solenoid (SOL7)	2
2	Drain pinch valve solenoid (SOL4)	4
3	Circulation pinch valve solenoid (SOL3)	8
4	Dump valve (SOL5)	16
5	Air-water solenoid valve (SOL8)	32
6	High pressure pump (P2)	64
7	Circulation pump (P1)	128

Examples:

command	(binary)	action
XBY(4001H)=255	11111111	all components listed above OFF
XBY(4001H)=254	11111110	SOL2 ON only
XBY(4001H)=249	11111001	SOL7 and SOL4 ON only
XBY(4001H)=253	11111101	SOL7 ON only
XBY(4001H)=119	01110111	SOL3 and P1 ON only
XBY(4001H)=243	11110011	SOL3 and SOL4 ON only

NOTE: SOL3 (Model 89 only), 4, 5, 7, and P2 require LS2 (seal pressure safety switch) to be closed in order to turn on when commanded by (4001H) address.

7. U5C Address 4002H, Binary 8 bits.

This address controls the air compressor (COMP), the heater (HTR1) and the diagnostic test modes. Caution must be exercised when programming this address. Mistakes involving the 1500 watt heater can cause personnel hazards and/or SYSTEM 1 damage.

Bit #

0 True – Compressor controlled from PT1 (40 psi ±0.1)

False – Compressor controlled from LS6 compressor control switch*

1 True – Compressor enabled,

False – Compressor disabled*

2 True – PT1 is in the standard mode*

False – PT1 is in the pressure test mode (Hi-Gain mode)

3 True – Conductivity test mode disabled (10K ohm)*

False – Conductivity test mode enabled

4 True – Heater Disabled

False – Heater Enabled

5 - 7 Unused

** Indicates the normal state.*

Examples:

Given: XBY(4002H)=ZZ, see below: (where ZZ is the decimal value)

Command	Decimal	(Binary)
All in normal state	28	11100
Compressor on and controlled by LS5	30	11110
Compressor on and controlled by PT1 *	31	11111
Pressure test mode	24	11000
Conductivity test mode enabled	20	10100
HEATER ON !!	12	01100

** Compressor is controlled by PT1 during Sterile Filter Membrane Test. Air-water solenoid valve (SOL8) which opens flow path from air manifold to the sterile filter housing, is also energized during the SFMT.*

Examples:

XBY(4002H) =28	11100	All above components OFF
XBY(4002H) =30	11110	Compressor ON (controlled by LS5)
XBY(4002H) =31	11111	Compressor ON (controlled by PT1)
XBY(4002H) =14	01110	Compressor ON (controlled by LS5) and HEATER ON !!

NOTE: Any value of ZZ less than 16 will TURN ON THE HEATER !!!

5.2.5 Variable Names:

General: Except where noted, during the DIAGNOSTIC cycle operation of the SYSTEM 1, the unit measures and stores the following values into memory. These values can be accessed via the hand terminal to assist in troubleshooting.

Except where noted, all variables apply to the DIAGNOSTIC cycle only. The variables, names and purposes are:

NOTE: Values are displayed as counts.

Variable	Name	Purpose
TMP (0)	Temperature @ TC1	Direct readout TC1.
TMP (1)	Temperature @ TC2	Direct readout TC2.
TMP (2)	Temperature @ TC3	Direct readout TC3.
FZ	Fill Zero	"Zero" pressure with the chamber full.
FP	Fill Pressure	Pressure across sterile filter during fill.
CZ	Circulation Zero	Zero pressure with chamber full, circulation pump on, and circulation pinch valve closed.
CP	Circulation Pressure	Pressure with the chamber full and the circulation pump on.
BT	Begin Temperature	Starting temperature of heat rate test.
TRY*	Try Number	# of times heat rate test retried. Max: 3.
CD*	Conductivity Reading	Measured prior to 10k ohm across probes.
CL*	Conductivity Calculated	Calculated limit conductivity test value with 10k ohm across probes (measured at board level).
PS	Pressure Drop	Pressure drop across SFM during SFMT.
FT*	Fill Time	Time to fill chamber during initial fill (Sterile cycle only).
I4*	Binary Integer	Contains binary data to be written to write-only location 4001H (port U5B).
U5B*	Port U5B Binary Data	Contains binary data that was written to write-only location 4001H (port U5B). This variable is updated during normal program execution immediately after writing the data to location 4001H. When the program is interrupted <Ctrl "C">, the user can read variables I4 & U5B. If they are the same value, output port U5B will also contain this data. If they are not the same value, simply continue the program using the "CONT" command and interrupt the program again. The values should now be equal.
FF*	Filter Failure Threshold	Level above which a SFMT Failure results. Level is dependent on the dip switch setting. For A1505 = 42 counts, for A1502 = 38 counts, for A1525 = 59 counts. Dip Switch Settings 1 2 3 4 A1505 OFF ON OFF OFF A1502 ON ON OFF OFF A1525 ON OFF OFF OFF
HP*	High Pressure	Number of times LS6 was read while there is no pressure.
HPC*	High Pressure Counts	Number of times LS6 was read during the test.
HPF*	High Pressure Failure	If receiving 0: failure during pump OFF section of test. If receiving 1: failure during pump ON section of test. If receiving 2: test is successful.

*Not used on Model 99

5.2.6 Using Variables:

After running a DIAGNOSTIC cycle, enter `PRINT FZ,CP <ENT>` into the hand terminal. This syntax will print the Fill Zero value (in counts) and the Circulation Pressure value (in counts) to the display of the hand terminal. If `PRINT TMP (0)` was entered into the hand terminal, then the display would show the actual temperature of TC1. The general syntax is:

```
PRINT (variable name) <ENT>
```

A comma must be used if more than one variable is to be displayed:

```
PRINT (variable name), (variable name) <ENT>
```

Variables will remain in the SYSTEM 1's memory until they are reset to zero at the start of another DIAGNOSTIC cycle, or if the unit is powered down.

During a DIAGNOSTIC cycle, the variables can be read to the hand terminal by using the following procedure:

```
<Ctrl C>
PRINT (variable name) <ENT>
CONT <ENT>
```

The CONT command continues the computer's software program from where it was interrupted with the <Ctrl C> command.

NOTE: Using these commands during a DIAGNOSTIC cycle may cause failures, but the information obtained may still be useful.

By placing a "#" after the print command, your request will be printed to the SYSTEM 1's printer.

5.3 MODEL 99 UNITS

5.3.1 Service Access Key (SAK)

In order to access the Service Mode or the Enhanced Operator Mode on the SYSTEM 1, a Service Access Key (SAK) is necessary. A SAK is issued to STERIS service technicians and to SYSTEM 1 customers who have completed a STERIS bio-med training class.

The STERIS technician SAK can be utilized on any STERIS equipment compatible with the SAK; however, it has an expiration date, clearly marked on the device, and must be returned for re-programming in much the same way a piece of calibrated test equipment is returned for calibration.

The SYSTEM 1 customer key is programmed to allow access to specified serial number equipment. In this manner equipment owners can perform full service on equipment within their facility. As new equipment is purchased, a new key with the new equipment serial number will be issued.

The procedures for accessing the Service Mode and Enhanced Operator Mode with either key are the same. The unit is powered down, the key installed, and then the unit is powered up. If the key is not expired (technician SAK) or the serial numbers match (customer SAK), access is granted. Should the key not function due to expiration or serial number difference, a message will be displayed that the key is not valid.

Refer to Figure 5-1, Service Program Tree for a quick reference to service routines.

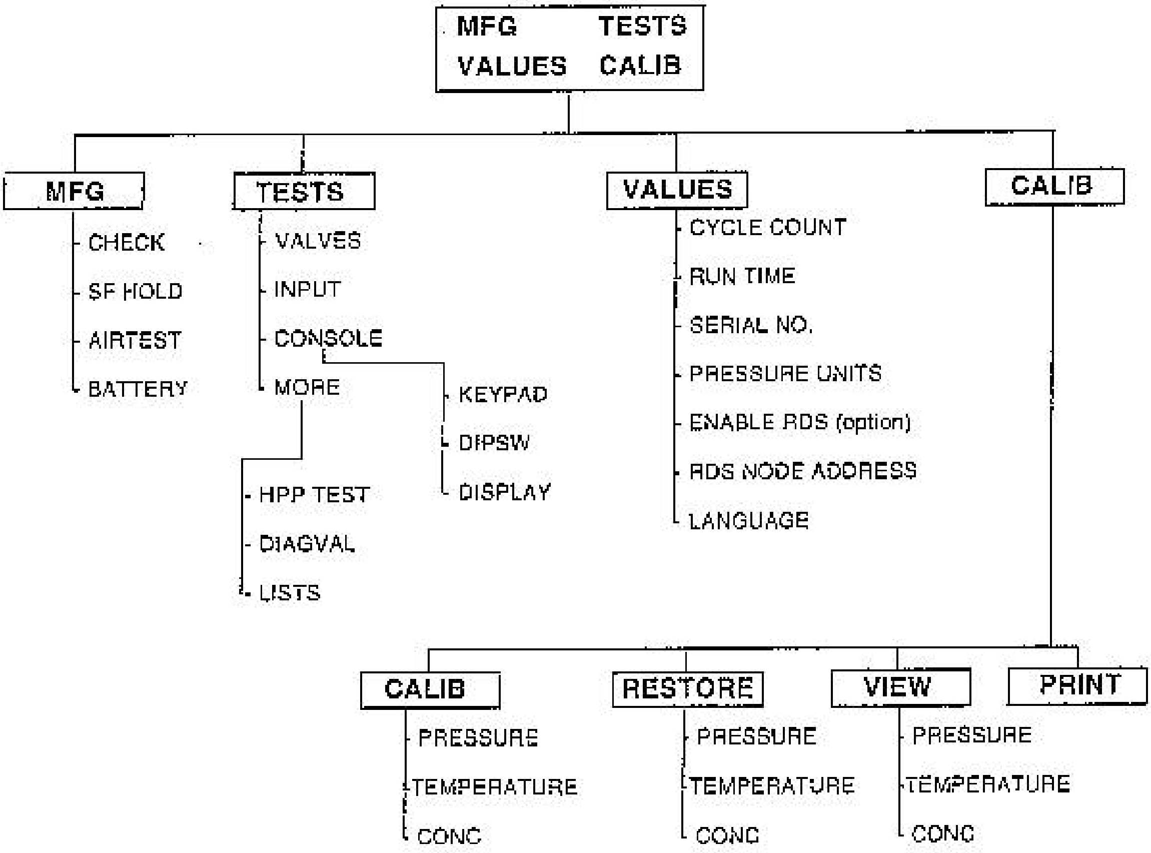

MFG TESTS
VALUES CALIB
MFG
CHECK
SF HOLD
AIRTEST
BATTERY
TESTS
VALVES
INPUT
CONSOLE
MORE
KEYPAD
DIPSW
DISPLAY
HPP TEST
DIAGVAL
LISTS
VALUES
CYCLE COUNT
RUN TIME
SERIAL NO.
PRESSURE UNITS
ENABLE RDS (option)
RDS NODE ADDRESS
LANGUAGE
CALIB
CALIB
PRESSURE
TEMPERATURE
CONC
RESTORE
PRESSURE
TEMPERATURE
CONC
VIEW
PRESSURE
TEMPERATURE
CONC
PRINT

Figure 5-1. Service Mode Program Tree – SYSTEM 1 Model 99

5.3.2 How to Access the Service Mode

To access the Service Mode:

1. Turn the Control Power switch OFF.
2. Connect the Service Access Key to the 9-pin connector located on the back of the unit.
3. Turn Control Power switch ON. Display shows:

TESTING MEMORY
PLEASE WAIT

---

4. After approximately 20 seconds, display will show that the key is being read by the control:

POLLING KEY

If the key is valid, the Service Access Key menu will be displayed. Use the left or right arrow (< or >) touch pads to move to the desired selection (blinking), then press the SAVE VALUES touch pad to save the selection.

SERVICE OPERATE
BURN IN

From the above menu, the following choices are available:

- Select SERVICE to access the test routines and parameter adjustments.
- Select OPERATE to return the unit to a normal operating mode, but with ability to display cycle parameters while running.
- Select BURN-IN for the RAM to be cleared and default parameters to be reloaded.

5.3.3 Service

Select **SERVICE**, then press SAVE VALUES touch pad. Display shows:

MFG TESTS
VALUES CALIB

Printer will also print "SERVICE MODE" information. See Figure 5-2.

NOTE: The information on the printout is related to the software version currently on the control board in the processor.

```
          SERVICE MODE

PROGRAM: 93919063
REV. X  XX/XX/XX
CRC = X X X X
BOOT VERSION 0

XX/XX/XX     X:XX:XX PM

RUN TIME      = X.XX hr
CYCLE CNT     = XX
SERIAL No. XXXXXXXXXX
```

Figure 5-2. Service Mode Information Printout

5.3.3.1 MFG (Manufacturing)

The manufacturing section is used by the factory prior to new unit shipment; however, several routines are useful in the field.

Select MFG, then press SAVE VALUES touch pad. Display shows:

CHECK SF HOLD
AIRTEST BATTERY

- CHECK

  CHECK is a routine used by the factory that checks the components listed in this procedure. Select CHECK, then press SAVE VALUES touch pad. Display shows:

AIR TEST TIME
XX MINUTE

This menu allows the setting time spent in AIR TEST. This is detailed later in this section. After setting the time, press SAVE VALUES touch pad. Display shows:

FACTORY CHECK
CHECKING ANALOG

The control checks Thermocouples TC1, TC2 and TC3, the ambient temperature sensor on the CPU, and the concentration monitor probes CP1 and CP2. The unit must be at ambient temperature and the concentration probes dry to pass. If failure is detected, printout will state failure and display will return to Main Menu:

CHECK SF HOLD
AIRTEST BATTERY

Once analog checks pass, Select **CHECK**, then press SAVE VALUES touch pad. Display shows:

FACTORY TEST
OPEN & CLOSE LID

This checks operation of lid switch. Open the lid. Display shows:

FACTORY TEST
LID OPEN

Close the lid. Display shows:

FACTORY TEST
VERIFY S2 ON & OFF

Check audible indication that S2 (seal relief, SOL2) is energized and de-energized. The controls allow five seconds to verify. Then display shows:

FACTORY TEST
VERIFY P1 ON & OFF

Check audible indication that P1 (circulation pump) is energized and de-energized. Control allows five seconds to verify. Display shows:

FACTORY TEST
COMP CONTROL ON

Compressor will run to pressure switch setting and then control will hold for two minutes. At the end of two minutes, counter (previously selected) will count down. Display shows:

AIR TEST
XX:XX

At the end of successful air test, display shows:

PRESS SAVE VALUES
TO CONTINUE

Press SAVE VALUES touch pad. Display shows:

VERIFY LATCH GAP
PRESS SAVE VALUES TO CONT

The latch gap can be checked. Press the SAVE VALUES touch pad. Display shows:

FACTORY TEST
VERIFY S7 ON & OFF

Check audible indication that S7 (inlet fill valve, SOL7) is energized and de-energized. Control allows five seconds to verify. Display shows:

FACTORY TEST
VERIFY S5 ON & OFF

Check audible indication that S5 (dump valve, SOL5) is energized and de-energized. Control allows five seconds to verify. Display shows:

FACTORY TEST
VERIFY DRAIN OFF

Check audible indication that drain pinch valve (V5) air pressure is relieved. Display shows:

FACTORY TEST
VERIFY CIRC OFF

Check audible indication that circulation pinch valve (V6) air pressure is relieved. Display shows:

INSERT TEST PLUG
PRESS SAVE VALUES TO CONT

Remove the sterile filter(FLT1). Place the test plug in the sterile filter housing. This test is to check the integrity of the housing. Press the SAVE VALUES touch pad. Display shows:

SFH TEST
PRESSURE XX:XX

Control pressurizes systems for a five-minute period. If pressure achieved is <36.73 psi or >43.75 psi, control will print "TRANSDUCER FAULT." Otherwise at the end of five minutes, display shows:

SFH TEST
HOLD XX:XX

Control monitors pressure loss for a five-minute period. The start pressure in psi is printed at the end of five minutes. Display shows:

PRESS SAVE VALUES
TO CONTINUE

The final pressure is printed along with the pressure differences; acceptable loss is 0.08 psi or less. S8 (SOL8) energizes and the control measures the CK8 (drain check valve), the printer prints its value as SFH pressure, acceptable pressure is >3.9 psi and < 11.7 psi. Press SAVE VALUES touch pad. Display shows:

FACTORY TEST
INFLATING SEAL

Display shows:

PRESS SAVE VALUES TO
CHECK HP PUMP

Display shows:

FACTORY TEST
VERIFY HP PUMP

H.P. pump runs for five seconds. Check audible indication for operation. At end of five seconds, seal deflates and control returns to Main Menu. Printer prints existing calibration data. Remove test plug and install sterile water filter.

- SF HOLD (Sterile Filter)

Select SF HOLD, then press SAVE VALUES touch pad. This test is a quick test of the integrity of the sterile filter. The chamber will fill, drain, and the housing will be pressurized with air. The start pressure will be printed along with the end pressure after 1 one minute. All values are in "psi" and acceptable pressure difference with an A1525 filter is 0.46 or less.

NOTE: During a normal DIAGNOSTIC cycle, the test is for five minutes. The control allows the following pressure drops:

FILTER PRESSURE DROP	
A1525	*2.30 psi*
A1505	*1.64 psi*
A1502	*1.48 psi*

In this SF HOLD TEST, the test is only for one minute, so the allowable pressure loss is 1/5 of the above values. Also note these pressure drops are equivalent to the "counts" value in the earlier model SYSTEM 1.

Printer will print "FACTORY TEST".

Select MFG, then press SAVE VALUES touch pad. Display shows:

SF HOLD TEST
FILLING CHAMBER

Display shows:

SF HOLD TEST
DRAINING CHAMBER

Display shows:

SF HOLD TEST
PRESSURIZING

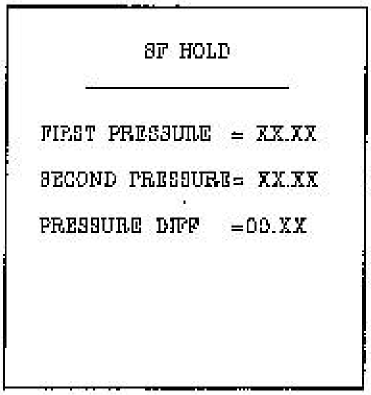
Display shows:

SF HOLD TEST
HOLDING

Display shows:

SF HOLD TEST
DEFLATING SEAL

Display then reverts to the Service Main Menu. Printer prints First Pressure, Second Pressure, and Pressure differences. See Figure 5-3.



```
SF HOLD
____________

FIRST PRESSURE  = XX.XX
SECOND PRESSURE= XX.XX
PRESSURE DIFF   =00.XX
```

Figure 5-3. SF Hold Test

- **AIR TEST**

This test is used to check for leaks in the compressed air system (lines, seals, etc.). The compressor will run to the compressor control switch (LS5) setting and hold for a selected time period. If the compressor does not turn back on during that time, the test is considered passed.

Select AIR TEST. Display shows:

CHECK SF HOLD
AIR TEST BATTERY

Use the keypad to select desired time for test, then press the SAVE VALUES touch pad. Display shows:

AIR TEST
00 MINUTES

Control remains for two minutes, then the countdown automatically starts. Display shows:

AIR TEST TIME
COMP CONTROL ON

NOTE: If compressor does not shut off within two minutes, test will not continue.

AIR TEST
X:XX

At the end of the countdown, if compressor stayed off, display shows:

AIR TEST
PASSED TEST

Display shows:

AIR TEST
DEFLATING SEAL

Display shows:

CHECK SF HOLD
AIR TEST BATTERY

- BATTERY

This section allows the factory to turn off the battery for long-term storage. This is not accessible with the technician or customer SAK.

5.3.3.2 TESTS

Select **TESTS**, then press SAVE VALUES touch pad. Display shows:

VALVES INPUT
CONSOLE MORE

- VALVES

Select VALVES, then press SAVE VALUES touch pad. Display shows:

tk s8 s5 s3 s4
s7 s2 s1 h p1 p2

At this point, the following outputs can be checked:

tk - Paper Take-up
s8 - Air-water solenoid valve (SOL8)
s5 - Dump valve (SOL5)
s3 - Circulation pinch valve solenoid (SOL3)
s4 - Drain pinch valve solenoid (SOL4)
s7 - Inlet fill valve (SOL7)
s2 - Seal release valve (SOL2)
s1 - Compressor release solenoid (SOL1) and enable compressor (COMP)
h - Heater element (HTR1)
p1 - Circulation pump (P1)
p2 - High pressure pump (P2)

CAUTION: Do not energize h, heater element (HTR1) unless chamber is full of water; element failure will occur.

CAUTION: Do not energize s2, seal release valve (SOL2) with water in the chamber; spill will occur.

Test each output, one at a time, by using the left or right arrow touch pad (< or >). The designator will blink when selected.

Check for proper ON and OFF operation shown on the display (CAPITAL LETTERS = energized, lowercase = de-energized). Press ENTER to energize output, press ENTER again to de-energize.

*NOTE: While in **VALVES**, the **STATUS** touch pad can be used to cycle through the screens to view the analogs and inputs. Pressing the PAPER FEED touch pad will force the unit to print the status of the LS6 and float block switch (LS3).*

Press CANCEL when done. Display shows:

MFG TESTS
VALUES CALIB

Select **TESTS**, then press SAVE VALUES touch pad. Display shows:

```
VALVES      INPUT
CONSOLE     MORE
```

- INPUT

Select INPUT, then press SAVE VALUES touch pad. Display shows:

```
lid  FLT  hpp  CMP
```

Check for proper ON and OFF operation shown on the display (CAPITAL LETTERS = switch closed, lowercase = switch open).

- LID = Lid switch (LS4)
- FLT = Float block switch (LS3)
- HPP = H.P. pump monitor pressure switch (LS6)
- CMP = Compressor control switch (LS5)

NOTE: Float block switch (LS3) and compressor control switch (LS5) are normally closed.

Press CANCEL when done. Display shows:

```
MFG         TESTS
VALUES      CALIB
```

Select TESTS, then press SAVE VALUES touch pad. Display shows:

```
VALVES      INPUT
CONSOLE     MORE
```

- CONSOLE

CONSOLE allows checking of the keypad, dip switch settings, and display.

Select **CONSOLE**, then press SAVE VALUES touch pad. Display shows:

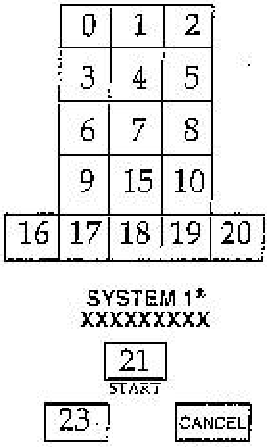
```
KEYPAD      DIPSW
DISPLAY
```

KEYPAD

Select KEYPAD, then press SAVE VALUES touch pad. Display shows:

```
* KEYPAD TEST *
    KEY =
```

Refer to the keypad chart. Press a key on the keypad. If the communication link is functioning properly, the corresponding number on the keypad will display.



NOTE: The CANCEL touch pad will not display a number. The test for the cancel touch pad is that it will exit this routine when pressed.

Select CANCEL. Display shows:

```
MFG         TESTS
VALUES      CALIB
```

Select TESTS, then press SAVE VALUES touch pad. Display shows:

```
VALVES      INPUT
CONSOLE     MORE
```

Select **CONSOLE**, then press SAVE VALUES touch pad. Display shows:

```
KEYPAD      DIPSW
DISPLAY
```

DIP SW (Dip Switch)

Select **DIP SW**, then press SAVE VALUES touch pad. Display shows:

```
1234
1111
```

The "1234" indicates the control board dip switch position and the number directly below indicates the setting of the switch. The "1" indicates OFF, and the "0" indicates ON.

The dip switch definitions are as follows:

- **Position 1 and 2** – select model of pressure transducer. Check Transducer Model No.:

Position 1:	Position 2:	Trans. M/N:
1(off)	1(off)	NOSHOK
0(on)	1(off)	Ametek - IPTG
1(off)	0(on)	Ametek - MPTG

- **Position 3** – direction of the printer (0= print from bottom up; 1= print from top down; 1 is default setting.)
- **Position 4** – printer self test mode (0= test mode; 1= normal operation). Printer will print: "** THIS IS A SELF TEST**." Access the dip switch through the cover panel on the backside of the control panel. Locate the plug button and remove. Use a small screwdriver or pen to activate the switch.

Select **CANCEL**. Display shows:

```
MFG        TESTS
VALUES     CALIB
```

Select **TESTS**, then press SAVE VALUES touch pad. Display shows:

```
VALUES     INPUT
CONSOLE    MORE
```

Select **CONSOLE**, then press SAVE VALUES touch pad. Display shows:

```
KEYPAD     DIPSW
DISPLAY
```

DISPLAY

Select **DISPLAY**, then press SAVE VALUES touch pad. Display shows:

```
■■■■■■■■■■■■■■■■■■■■
■■■■■■■■■■■■■■■■■■■■
```

The display will respond by lighting up all the pixels in the display. Inspect the display for burned out pixels.

Select CANCEL. Display shows:

```
MFG        TESTS
VALUES     CALIB
```

Select **TESTS**, then press SAVE VALUES touch pad. Display shows:

```
VALUES     INPUT
CONSOLE    MORE
```

- MORE

Select **MORE**, then press SAVE VALUES touch pad. Display shows:

```
HPP TEST   DIAGVAL
LISTS
```

HPP TEST

The HPP TEST is used to test the operation of the high-pressure pump.

Select **HPP TEST**, then press SAVE VALUES touch pad. Display shows:

```
HPP TEST
INFLATING SEAL
```

Printer will print: "HPP TEST." Display shows:

```
HPP TEST
FILLING CHAMBER
```

Display shows:

```
HPP TEST
HPP SWITCH CLSD/OPEN
```

During this time, the H.P. pump is running and the status of the switch is shown in real time. If the switch is closed, the display will show "CLSD." If the switch is open, the display will show "OPEN." Press SAVE VALUES to turn off pump and drain unit.

Press SAVE VALUES touch pad. Display shows:

```
HPP TEST
DRAINING CHAMBER
```

Display shows:

```
HPP TEST
DEFLATING SEAL
```

Display shows:

```
MFG         TESTS
VALUES      CALIB
```

Select **TESTS**, then press SAVE VALUES touch pad. Display shows:

```
VALUES      INPUT
CONSOLE     MORE
```

Select **MORE**, then press SAVE VALUES touch pad. Display shows:

```
HPP TEST    DIAGVAL
LISTS
```

DIAGVAL (Diagnostic Values)

Select **DIAGVAL** to print out the diagnostic values from the last diagnostic cycle run.

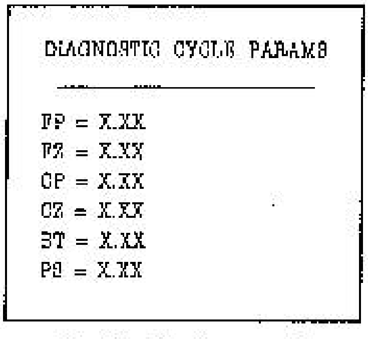
Select **DIAGVAL**, then press SAVE VALUES touch pad. Display shows:

```
HPP TEST    DIAGVAL
LISTS
```

The printer will print: "DIAGNOSTIC CYCLE PARAMS." Refer to Figure 5-4. Press CANCEL touch pad to continue.

NOTE: For diagnostic values, all pressure readings (except BT) are listed in "psi," not "counts." Reference:
1 count = 0.39 psi
1 psi = 2.56 counts
Value should be equivalent to earlier model SYSTEM 1.

NOTE: Reference 5.2.5 for explanation of variables.



```
DIAGNOSTIC CYCLE PARAMS
________________________

FP = X.XX
FZ = X.XX
OP = X.XX
OZ = X.XX
BT = X.XX
PS = X.XX
```

Figure 5-4. Diagnostic Cycle Parameters

NOTE: There are no HP, HPC, and HPF values. Control does not use the same method as earlier processors to measure HP Pump performance; therefore HP, HPC, and HPF are not used.

```
MFG         TESTS
VALUES      CALIB
```

Select **TESTS**, then press the SAVE VALUES touch pad. Display shows:

```
VALUES      INPUT
CONSOLE     MORE
```

Select **MORE**, then press the SAVE VALUES touch pad. Display shows:

```
HPP TEST    DIAGVAL
LISTS
```

LISTS

Select **LISTS** to delete the Operator ID and/or the Physician ID list(s). When display shows:

Select **LISTS**, then press the SAVE VALUES touch pad. Display shows:

```
PRINT LISTS
CLEAR LISTS
```

To print a list, select the **PRINT LISTS** option, then press the SAVE VALUES touch pad. Display shows:

```
PRINT OPER LIST
PRINT PHYS LIST
```

Select the appropriate response, then press the SAVE VALUES touch pad. The list will be printed.

To clear a List, select the **CLEAR LISTS** option, then press the SAVE VALUES touch pad. Display shows:

```
CLEAR OPER LIST
CLEAR PHYS LIST
```

Select the desired list to clear, then press the SAVE VALUES touch pad.

5.3.3.3 VALUES

Use the cursor to select VALUES. Press the SAVE VALUES touch pad to enter the change values routine. These values are not found in the operator Change Value Procedures. This section includes: Cycle Count, Run Time, Temperature Units, Pressure Units, Time Set.

The Main Menu display shows:

```
MFG        TESTS
VALUES     CALIB
```

Select **VALUES**, then press SAVE VALUES touch pad. Display shows:

```
CYCLE-COUNT=
XXXXXXXX
```

When installing a new Control Board, the cycle tapes should be checked and the current cycle count entered into control. Press SAVE VALUES, touch pad to continue. Display shows:

```
RUN-TIME=
XXXXXXXX hrs
```

This is an elapsed time from control startup. If a new control board is being installed, start the time at "0" hours. Press SAVE VALUES touch pad to continue. Display shows:
(Note: Only accessible when using a technician SAK)

```
SERIAL NO.
XXXXXXXX
```

Enter Serial Number of unit, using the keypad and the right or left arrows (<- or ->). Press the SAVE VALUES touch pad to continue. Display shows:

```
PRESSURE UNITS
PSI          BAR
```

Use the right or left arrows (<- or ->) to select pressure units. Press the SAVE VALUES touch pad to continue. Display shows:

```
ENABLE RDS?
YES          NO
```

RDS selection is used for the RDS option. This requires a separate kit.

If RDS is to be enabled, select YES. If not enabled, select NO. If NO is selected, display will advance to "LANGUAGES."

Select "YES" if connected to RDS. Press the SAVE VALUES touch pad to continue. Display shows:

```
RDS NODE
ADDRESS=XX
```

This is used for RDS applications. Follow the RDS kit instructions to identify node address. Enter the correct address by using the number keypad.

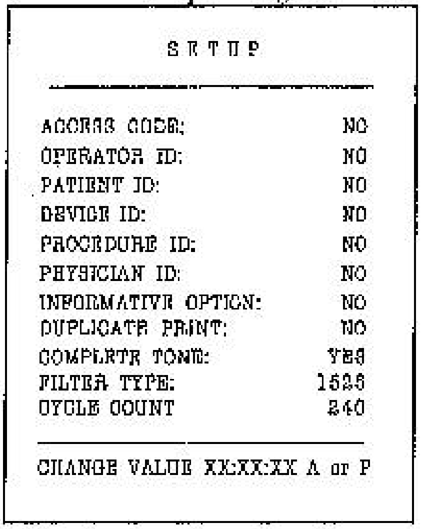
Press the SAVE VALUES touch pad to continue. Display shows:

```
LANGUAGE
ENGLISH
```

Use the left/right arrows (< or >) to select the desired language. Press the SAVE VALUES touch pad. Display shows:

```
* UPDATING *
* MEMORY *
```

The printer will print: "* Change Value X:XX:XXA or P." See Figure 5-5. The printer will print the values selected in the normal Operating Mode.



```
              S E T U P
   ________________________________

   ACCESS CODE:                  NO
   OPERATOR ID:                  NO
   PATIENT ID:                   NO
   DEVICE ID:                    NO
   PROCEDURE ID:                 NO
   PHYSICIAN ID:                 NO
   INFORMATIVE OPTION:           NO
   DUPLICATE PRINT:              NO
   COMPLETE TONE:               YES
   FILTER TYPE:                1525
   CYCLE COUNT                  240
   ________________________________
   CHANGE VALUE XX:XX:XX A or P
```

Figure 5-5. Setup

5.3.3.4 Calibration

The Calibration section of the Service Mode has four sub-sections:

- CALIBRATION routines – for adjusting pressure, temperature and concentration.
- RESTORE routine – to review or enter calibration data.

- VIEW routines – to review real time in each of the analog channels.
- PRINT routine – for printouts of current calibration data.
- CALIBRATION

NOTE: During the Calibration routine, when the control displays: "STABILIZING," the control is waiting for the temperature or pressure to be at a stable point to allow for setting the correct value. If the control remains in STABILIZING and does not proceed, it would indicate that there is a fault that must be repaired before calibration can be accomplished successfully.

When the display shows:

```
MFG       TESTS
VALUES    CALIB
```

Select **CALIB**, then press SAVE VALUES touch pad. Display shows:

```
CALIB     RESTORE
VIEW      PRINT
```

Select **CALIB**, then press SAVE VALUES touch pad. Display shows:

```
PRESS     TEMP
CONC
```

PRESSURE CALIBRATION

Select **PRESS**, then press SAVE VALUES touch pad. Display shows:

```
WARNING! CALIB
WILL BE CHANGED
```

Press SAVE VALUES to continue. Display shows:

```
INFLATING SEAL
```

Display shows:

```
FILLING CHAMBER
```

Display shows:

```
STABILIZING
P=0.XX psi
```

The control will hold for a period of time, allowing pressure to stabilize, read the pressure on the transducer due to the head of water in the chamber, and set the calibration point automatically. No adjustments are necessary by the technician. Unit will proceed to drain. Display shows:

```
DRAINING CHAMBER
```

Display shows:

```
* UPDATING *
* MEMORY *
```

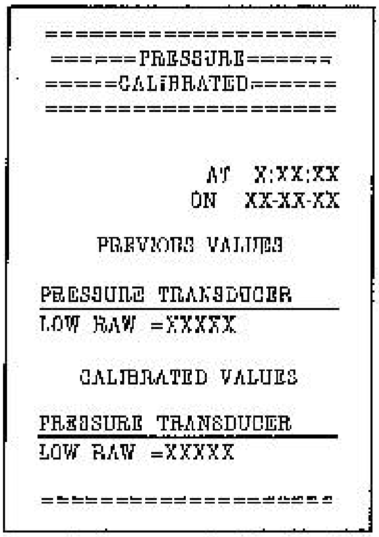
Display shows:

```
DEFLATING SEAL
```

Display shows:

```
* PRESSURE *
* CALIBRATED *
```

Printer will print the pressure-calibrated values (see Figure 5-6, for example). Press SAVE VALUES touch pad to continue.



```
===================
======PRESSURE======
=====CALIBRATED======
===================


           AT  X:XX:XX
           ON   XX-XX-XX

     PREVIOUS VALUES

PRESSURE TRANSDUCER
LOW RAW =XXXXX

    CALIBRATED VALUES

PRESSURE TRANSDUCER
LOW RAW =XXXXX

===================
```

Figure 5-6. Pressure Calibrated Values

TEMPERATURE CALIBRATION

Temperature calibration is not normally necessary on SYSTEM 1.

NOTE: A calibrated temperature measuring device is required for this procedure.

A container with cold water (5° to 10°C [40° to 50°F]) and hot water (55° to 65°C [130° to 150°F]) will be necessary. The thermocouple(s) will be removed from their mounting location and be placed in the bath.

NOTE: To make calibration easier, use a spare thermocouple in place of TC1, TC2, and TC3 thermocouples in the unit. Calibrate each thermocouple separately. Attach the spare thermocouple to the proper connection on CN1 while leaving the threaded end hang free. Free-hanging end is inserted into cold and hot water baths as directed during procedure.

When the display shows:

MFG TESTS
VALUES CALIB

Select **CALIB**, then press SAVE VALUES touch pad. Display shows:

CALIB RESTORE
VIEW PRINT

Select **CALIB**, then press SAVE VALUES touch pad. Display shows:

PRESS TEMP
CONC

Select **TEMP**, then press SAVE VALUES touch pad. Display shows:

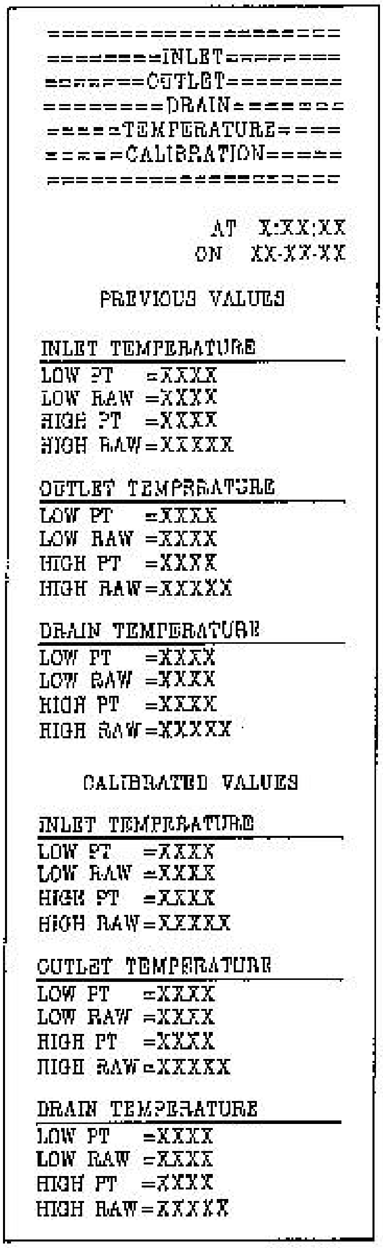
TC1 **INLET OUTLET** TC2
DRAIN TC3 **ALL**

NOTE: TC1 = Thermocouple #1 (drain transition block), TC2 = Thermocouple #2 (high pressure transition block) and TC3 = Thermocouple #3 (drain block assembly). Inlet and outlet as referenced to the heater.

Select one: INLET/OUTLET/DRAIN/ALL, then press SAVE VALUES touch pad. Display shows:

WARNING! CALIB
WILL BE CHANGED

Printer will print "Previous Values" (see Figure 5-7).



```
====================
=========INLET========
=======OUTLET========
=========DRAIN========
=====TEMPERATURE====
=====CALIBRATION=====
====================

                AT  X:XX:XX
                ON  XX-XX-XX

        PREVIOUS VALUES

INLET TEMPERATURE
LOW PT   =XXXX
LOW RAW  =XXXX
HIGH PT  =XXXX
HIGH RAW=XXXXX

OUTLET TEMPRRATURE
LOW PT   =XXXX
LOW RAW  =XXXX
HIGH PT  =XXXX
HIGH RAW=XXXXX

DRAIN TEMPERATURE
LOW PT   =XXXX
LOW RAW  =XXXX
HIGH PT  =XXXX
HIGH RAW=XXXXX

      CALIBRATED VALUES

INLET TEMPRRATURE
LOW PT   =XXXX
LOW RAW  =XXXX
HIGH PT  =XXXX
HIGH RAW=XXXXX

OUTLET TEMPERATURE
LOW PT   =XXXX
LOW RAW  =XXXX
HIGH PT  =XXXX
HIGH RAW=XXXXX

DRAIN TEMPERATURE
LOW PT   =XXXX
LOW RAW  =XXXX
HIGH PT  =XXXX
HIGH RAW=XXXXX
```

Figure 5-7. Temperature Calibrated Values

Press SAVE VALUES touch pad. Display shows:

PLACE TC(S) IN
LO BATH PRESS SV

Place the thermocouple(s) and the temperature measuring device in the cold water container and press SAVE VALUES touch pad. Display shows:

STABILIZING LOW
(*THERMOCOUPLE LOCATION*) = XX.XC

Display shows:

LO SET PT XX.X
PRESS SV TO SET

Using the key pad, adjust the displayed temperature to match the temperature measured by calibrated device, then press SAVE VALUES (SV) touch pad. Display shows:

PLACE TC(S) IN
HI BATH PRESS SV

Place the thermocouple(s) and the temperature measuring device in the hot water container and press SAVE VALUES touch pad. Display shows:

STABILIZING HIGH
***(THERMOCOUPLE LOCATION)* = XX.XC**

Display shows:

HI SET PT XX.X
PRESS SV TO SET

Using the keypad, adjust the displayed temperature to match the temperature measured by the calibrated device, then press SAVE VALUES touch pad. Display shows:

*** UPDATING ***
*** MEMORY ***

Display shows:

**** (THERMOCOUPLE LOCATION) ****
*** CALIBRATED ***

The printer then prints calibration data. See Figure 5-7, for example. Press the CANCEL touch pad to exit calibration.

Display shows:

MFG TESTS
VALUES CALIB

CONCENTRATION PROBE CALIBRATION (CONC)

This routine is used to calibrate the Control Board using established values. The technician will be required to access test points on the Connector Board adjacent to the Power Supply.

When display shows:

CALIB RESTORE
VIEW PRINT

Select CALIB, then press SAVE VALUES touch pad. Display shows:

PRESS TEMP
CONC

Select CONC, then press SAVE VALUES touch pad. Display shows:

WARNING! CALIB
WILL BE CHANGED

At this point, CN9 must be disconnected for the remainder of this calibration procedure. Press SAVE VALUES touch pad. Display shows:

PLACE JUMPER ON
TP 1 & 2 PRESS SV

Printer will print existing CONC calibration data.

Locate the test points on the connector board and jumper TP1 and TP2 (low points). Press the SAVE VALUES touch pad. Display shows:

STABILIZING LOW
CONC = XX

Display shows:

PLACE JUMPER ON
TP 1 & 3 PRESS SV

Locate the test points on the connector board and jumper TP1 and TP3 (high points). Press the SAVE VALUES touch pad. Display shows:

STABILIZING HIGH
CONC = XX

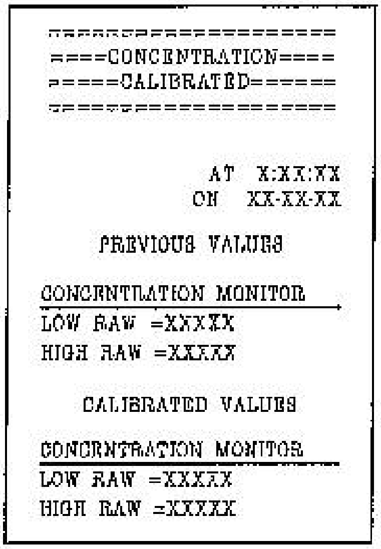
Display shows:

* UPDATING *
* MEMORY *

Display shows:

* CONC MONITOR *
* CALIBRATION *

Printer then prints new calibration data. See Figure 5-8.



```
====================
====CONCENTRATION====
=====CALIBRATED======
====================


             AT  X:XX:XX
             ON  XX-XX-XX

      PREVIOUS VALUES

CONCENTRATION MONITOR
LOW RAW =XXXXX
HIGH RAW =XXXXX

     CALIBRATED VALUES

CONCENTRATION MONITOR
LOW RAW =XXXXX
HIGH RAW =XXXXX
```

Figure 5-8. Concentration Probe Calibration

Remove jumpers from the board and press SAVE VALUES. Display Shows:

MFG   TESTS
VALUES   CALIB

Reinstall CN9.

RESTORE CALIBRATION DATA

Select CALIB, then press SAVE VALUES touch pad. Display shows:

CALIB   RESTORE
VIEW   PRINT

Select RESTORE, then press SAVE VALUES touch pad. Display shows:

PRES   TEMP
CONC

The routines are similar for PRESS, TEMP, and CONC. When a selection is made, the following is displayed:

WARNING! CALIB
WILL BE CHANGED

Press SAVE VALUES touch pad. Display shows data points that can be changed, such as LOW RAW, HIGH RAW, LOW PT, HIGH PT. Temperatures use all points, CONC uses only LOW and HIGH RAW, and PRESSURE uses LOW RAW only. Data can be entered using the keypad. If the previous calibration data needs to be re-entered due to a calibration error, use the print function described later in this section ("PRINT"). Press the SAVE VALUES touch pad. Display shows:

* UPDATING *
* MEMORY *

Display shows:

PRES   TEMP
CONC

Select CANCEL to continue. Display shows:

MFG   TESTS
VALUES   CALIB

VIEW

The current real time value of pressure, temperature, and concentration can be viewed in this routine.

Select CALIB, then press SAVE VALUES touch pad. Display shows:

CALIB   RESTORE
VIEW   PRINT

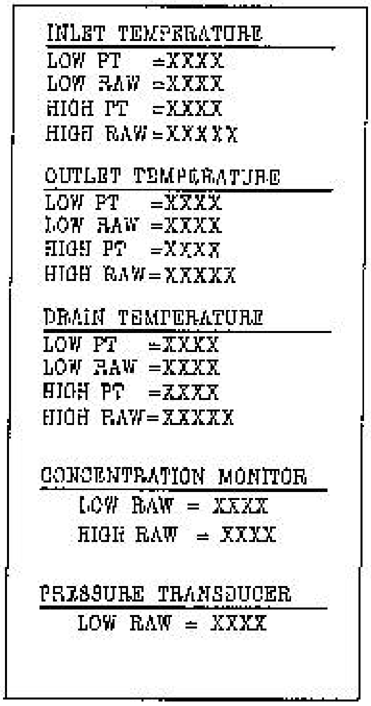
Select VIEW then press SAVE VALUES touch pad. Display shows:

PRES   TEMP
CONC

Selecting PRESS/TEMP/CONC will now display the current, real-time reading. Press CANCEL after reading an item. Re-enter VIEW if other points need to be read.

PRINT

Selection of this function will allow all current calibration data to be printed. See Figure 5-9 for example.



```
INLET TEMPERATURE
LOW PT   =XXXX
LOW RAW  =XXXX
HIGH PT  =XXXX
HIGH RAW=XXXXX

OUTLET TEMPERATURE
LOW PT   =XXXX
LOW RAW  =XXXX
HIGH PT  =XXXX
HIGH RAW=XXXXX

DRAIN TEMPERATURE
LOW PT   =XXXX
LOW RAW  =XXXX
HIGH PT  =XXXX
HIGH RAW=XXXXX

CONCENTRATION MONITOR
    LOW RAW = XXXX
    HIGH RAW  = XXXX

PRESSURE TRANSDUCER
    LOW RAW = XXXX
```

Figure 5-9. Calibration Data Printout

5.4 ENHANCED OPERATOR MODE

When this is selected, the display will revert to a standard operator mode screen; however, while the cycle is progressing, pressing the STATUS button will allow the display to show various parameters that are not seen in normal operation. These additional displays are as follows:

- Thermocouple temperatures TC1, TC2, and TC3 (read in degrees C)
- Concentration monitor
- Pressure (read by transducer, read in PSI)
- Cycle phase

Under normal conditions, the display will show "OPERATING," with a projected time to completion. Pressing the STATUS button will show the first alternate display. Pressing again will show the second alternate display, and so on. Pressing the PAPER FEED touch pad will force the unit to print the current status of the LS6 and float switch.

NOTE: The display reverts back to the OPERATING display after a few seconds, so it is necessary to continue to press the STATUS button to continue to show the alternate displays.

5.4.1 Burn-In

Selecting Burn-In will set all parameters to default values, and printer will print the default values.

5.4.2 How To Exit Service Mode

To exit Service Mode, turn power OFF, remove Service Access Key, then turn power back ON.

Section 6: Inspection and Maintenance

6.1 GENERAL

Maintenance procedures described in this section should be performed at regular intervals, as indicated. The frequency indicated is the minimum, and should be increased if usage of the unit demands. Should a problem occur, refer to Section 8 Troubleshooting.

6.2 DAILY SYSTEM 1® STERILE PROCESSING SYSTEM MAINTENANCE

WARNING: Disconnect electrical power before cleaning.

1. Clean external surfaces (Figure 6-1).

   Wipe the SYSTEM 1 with a soft cloth dampened with 70% isopropyl alcohol.

2. Open lid (Figure 6-2).

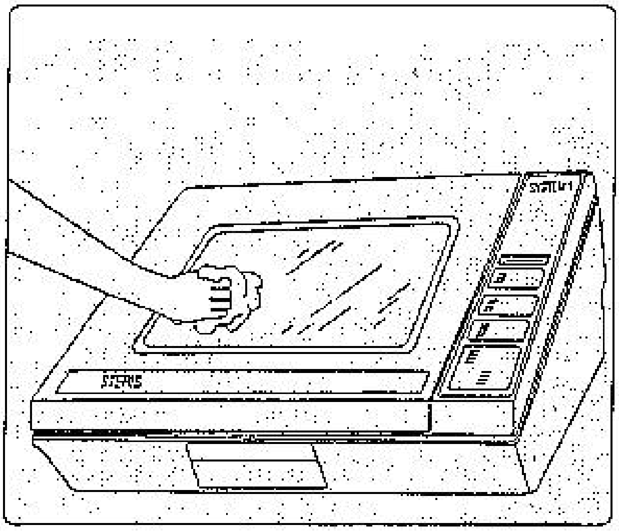


Figure 6-1. Clean SYSTEM 1 External Surfaces

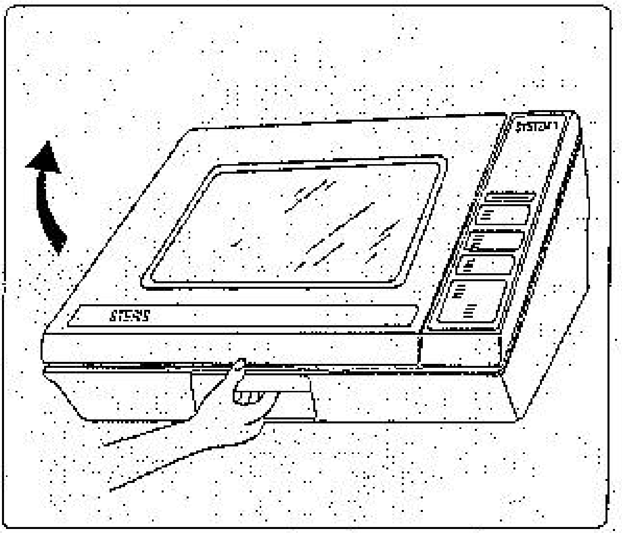


Figure 6-2. Open Lid

3. Clean Processing Tray (Figure 6-3).

   Processing tray/container: Wipe the inner surface and seal, processing tray/container, and accessory rack with a soft cloth dampened with 70% isopropyl alcohol.

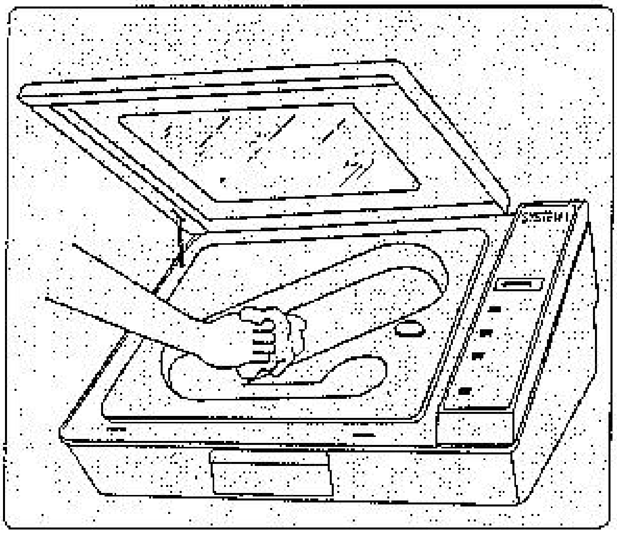


Figure 6-3. Clean Processing Tray

Flexible Processing Tray: Wipe the inner surface and seal, processing tray, and accessory rack with a soft cloth dampened with 70% isopropyl alcohol (Figure 6-4).

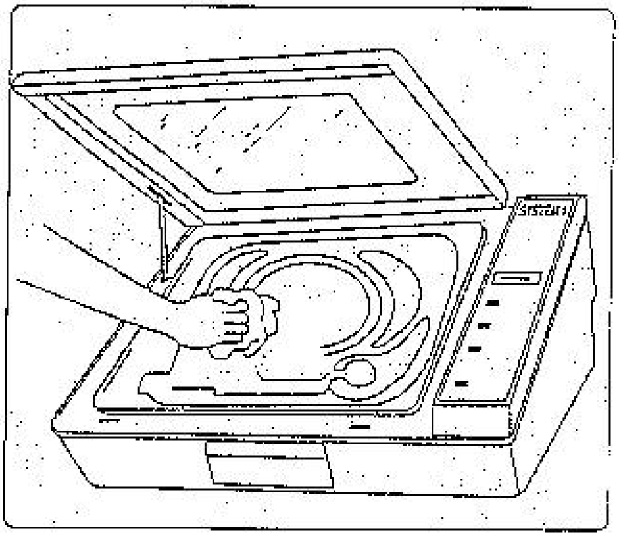


Figure 6-4. Clean Flexible Tray

4. Wipe aspirator assembly and sterilant compartment with a soft cloth dampened with 70% isopropyl alcohol (Figure 6-5).
5. Check aspirator assembly. Ensure that probe lumen is clear. Inspect aspirator for cracks or chips. Ensure hose connections are secure.

   IMPORTANT: If any damage is visible on the aspirator assembly, replace it immediately.

WARNING Use of a blocked or damaged aspirator may result in ineffective sterilization.

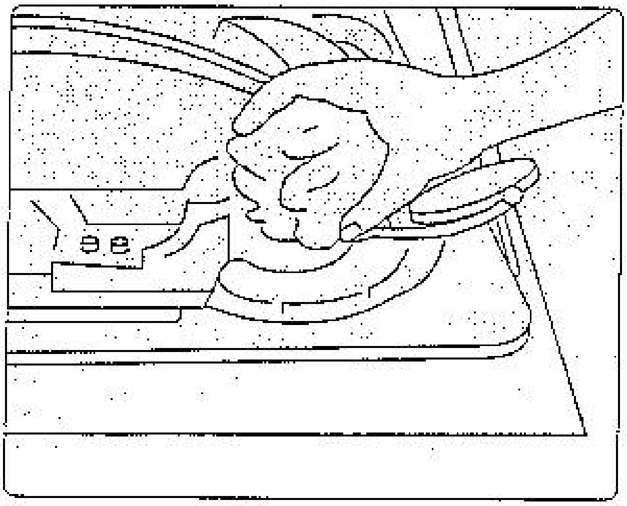


Figure 6-5. Clean Aspirator Tube Assembly

Step 6. Check Drain Screen (Figure 6-6)

a. Drain screen is located in the bottom of the sterilant compartment.

b. Ensure screen is clean. Remove any debris or lint from screen. (A straight hemostat or smooth pickups will help.)

c. The screen may be removed for thorough cleaning by lifting the processing tray and unscrewing the drogue. Replace screen after cleaning.

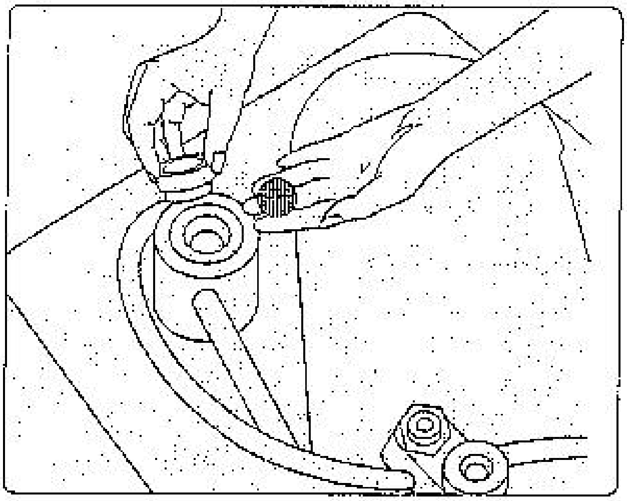


Figure 6-6. Check Drain Screen

7. Remove processing tray from drip pan.
8. Clean drip pan. (Figure 6-7)

   Clean drip pan using a soft cloth dampened with 70% isopropyl alcohol.

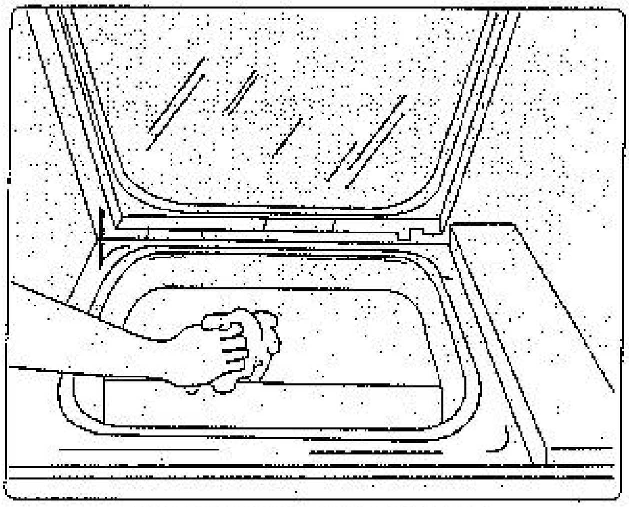


Figure 6-7. Clean Drip Pan

9. Replace processing tray.

   Replace processing tray in chamber. Place processing container and / or accessory rack on processing tray (if applicable).

10. Check printer paper (Figure 6-8)

    On Model 89 and Model 90 units:

    Open control panel and check printer paper. Replace with new roll if needed. (Refer to Section 9.)

    On Model 99 units:

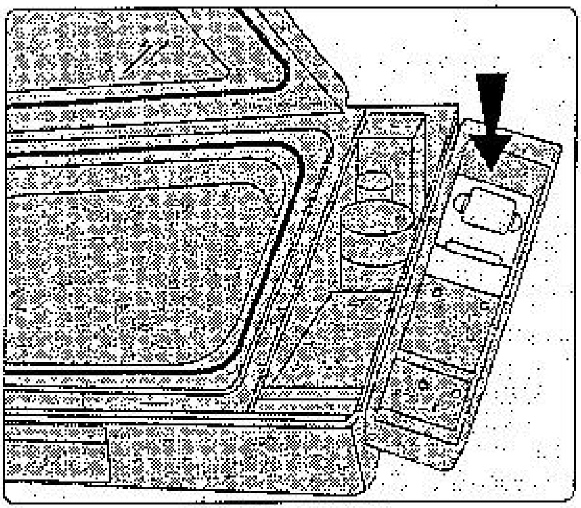
    Open printer paper access cover and check printer paper supply. Replace printer paper roll if necessary.

11. Check printer ribbon (applies to Model 99 units only).

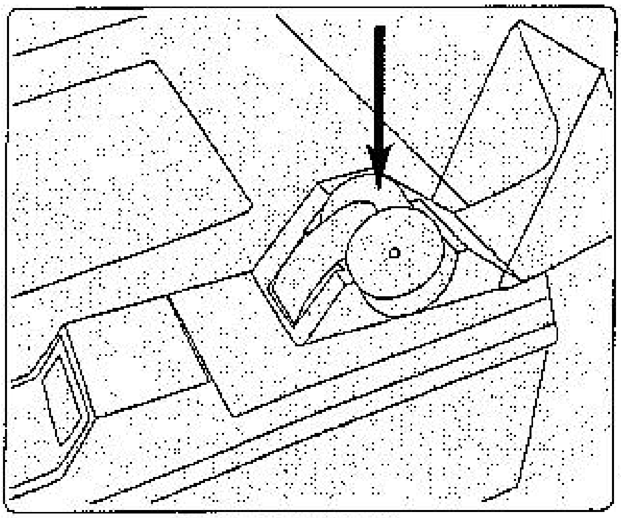
    Check print quality from previous day's printouts. Replace ribbon as needed. (Refer to Section 9.)

12. Review Printouts

    Check printouts for any indication of cycle faults or excessive fill times. Contact a service representative for repairs when necessary. Refer to Section 9 for filter change procedures.



Model 90 Unit Shown



Model 99 Unit Shown

Figure 6-8. Check Printer Paper Supply and Ribbon, Verify Print Quality

6.3 PREVENTIVE MAINTENANCE SCHEDULE

Inspections can be performed on a monthly, bimonthly, quarterly, or semiannual basis, depending on the usage of the unit. Where "each" is indicated below, the step is to be performed at each inspection.

Service Required	Frequency
1.0 Preparation	
1.1 Discuss operation with equipment operators and check printouts	Each
1.2 Follow lock-out/tag-out procedures	Each
2.0 Filters	
2.1 Replace sterile air filter	2x/year
2.2 Verify sterile water filter and pre-filters for proper performance	Each
3.0 Valves	
3.1 Replace CK1, CK2, CK3	2x/year
3.2 Rebuild CK8	1x/year
3.3 Replace pinch valve sleeves	1x/year
3.4 Verify performance of CK1, CK2, CK3, CK4, CK5, CK6, CK7, CK8, and CK10	Each
3.5 Verify performance of SOL1, SOL2, SOL3, SOL4, SOL5, SOL7, and SOL8	Each
4.0 Miscellaneous Components	
4.1 Check lid gas spring	Each
4.2 Check aspirator for damage	Each
4.3 Check lid seal for damage	Each
4.4 Check inflatable seal for leaks	Each
4.5 Inspect drip pan for cracks	Each
4.6 Check entire unit for evidence of fluid leaks	Each
4.7 Check all hose clamps and air line fittings	1x/year
4.8 Inspect lid latch gap	
4.9 Inspect lid assembly (seal and header block)	
4.10 Inspect all trays	
5.0 Component Tests	
5.1 Verify output of air compressor	1x/year
5.2 Verify output of high pressure pump	1x/year
5.3 Perform LS6 switch test	Each

Service Required	Frequency
6.0 Control	
6.1 Verify proper operation of printer	Each
6.2 Verify all touch pads function properly	Each
6.3 Verify date and time are correct	Each
6.4 Verify operation of battery-backed RAM	Each
6.5 Verify proper operation of buzzer	Each
6.6 Check calibration of pressure transducer	1x/year
7.0 Final Checkout and Test	
7.1 Clean dirt and lint from control components	Each
7.2 Re-install any panels removed	Each
7.3 Verify unit has proper labels	Each
7.4 Run diagnostic cycle	Each
7.5 Run sterile cycle	Each

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Section 7: Field Test Procedures

7.1 GENERAL

This section is to be used to verify that the SYSTEM 1® Sterile Processing System is operating within manufacturer's specification. These tests would be utilized in addition to the SYSTEM 1's DIAGNOSTIC cycle to evaluate various components. These tests are to be performed by qualified trained service personnel with appropriate test instrumentation.

7.2 TEST INSTRUMENTATION

The following instrumentation will be utilized in this section:

1. STERIS hand held terminal (Model 89 and Model 90 units only)
2. STERIS Service Access Key (Model 99 units only)
3. Calibrated potentiometer and thermocouple leads
4. Calibrated pressure gauge
5. Digital VOM

7.3 INSTALLATION VERIFICATION

Refer to the STERIS Site Prep Guide 612022. It will be necessary to verify the following utilities:

1. Water pressure: 40 to 50 psi
2. Water temperature: 43° to 48°C (46° to 48°C recommended for optimum cycle times). 109° to 118°F (115° to 118°F, recommended).
3. Water flow rate: 15 lpm @ 40 psi
4. Electrical Voltage: 120 VAC (+5% / -10%) or 230 VAC (+5% / - 10%).
5. GFI circuit: Trips when test button depressed.
6. Drain piping diameter: 1 ¼" I.D. diameter minimum.
7. Drain piping slope: Hoses must slope downward and not have any dips/bows.
8. Water supply piping: 1 ½" diameter minimum.
9. Level of mounting surface: Level with use of a spirit level or equivalent.
10. Room temperature: 60° to 90°F (16° to 32°C).

7.4 TEST PROCEDURES

The procedures in this section apply to Mode 89, Model 90 and Model 99 units. Due to control differences, the procedures will be labeled as to which units they apply.

7.4.1 Pressure Transducer Calibration

- **Model 89 and Model 90 Units**

1. Using the hand terminal, enter the following commands, with <ENT> at the end of each line.

   NOTE: Underscores indicate where spaces are entered.

   ```
   XBY(4002H)=30
   RAM
   10_XBY(4001H)=249
   20_DO:A=XBY(4000H):UNTIL_A.AND.2
   30_XBY(4001H)=251:END
   RUN
   ```

   The compressor starts, the machine fills with water then stops.

2. Wait a minimum of two minutes while typing in the following commands, with <ENT> at the end of each line:

   ```
   NEW
   PRINT_USING(#.##)
   10_B=0
   20_FOR_I=1TO100
   30_A=XBY(0E006H)
   40_B=B+A
   50_NEXT_I
   60_PRINT_B/100,CR,
   70_GOTO_10
   RUN
   ```

3. The display outputs the average of the last 100 readings. Adjust potentiometer #R29 until the readings consistently fall between 1.60 and 2.00 counts, with a target level of 1.75 counts.

4. To drain and rest the unit, and to return control to the SYSTEM 1, type the following:

   <CTRL C>

XBY(4001H)=119	Turns ON the circulation pump, closes the circulation pinch valve, and opens the drain pinch valve. This drains the SYSTEM 1.

   Wait until the unit completely drains, then type the following:

XBY(4002H)=28	This turns OFF the air compressor.
XBY(4001H)=254	This releases the lid seal.
XBY(4001H)=255	
ROM	
RUN	Returns the SYSTEM 1 to the READY condition.

- **Model 99 Units**

For calibration procedures for Model 99 units, refer to Section 5, Service Mode.

7.4.2 Temperature Calibration

- **Model 89 and Model 90 Units**

No calibration procedure is available for these models.

- **Model 99 Units**

For Temperature Calibration procedure for Model 99 units, refer to Section 5, Service Mode.

7.4.3 Concentration Monitor Calibration

- **Model 89 and Model 90 Units**

No calibration procedure is available for these models.

- **Model 99 Units**

For concentration monitor calibration procedure for Model 99 units, refer to Section 5, Service Mode.

7.4.4 H.P. Pump Flow Rate and Pressure Test

The check for H.P. pump flow rate and pressure utilizes the same measurement equipment. The tray is removed for this test. The manipulation of the SYSTEM 1 valves and pump differs and will be discussed separately.

Equipment - Use kit (Part Number 764329-097), consisting of plumbing fittings needed to adapt to STERIS Heise pressure gauge. A flask or similar container capable of measuring 2 L (0.53 gal) is also required. Substitution of an accurate pressure gauge is acceptable. The tubing supplied in the kit is attached to the high-pressure quick disconnect post with a hose clamp. For the flow test, the hose is directed to the 2 L (0.53 gal) container. For the pressure test, the hose is connected to the gauge.

For the flow rate test an acceptable range is 2 L (0.53 gal) in 37 to 57 seconds (3.2 to 2.1 lpm). For the pressure test, an acceptable range is 13.5 to 19.5 psi for 60Hz; 13 to 19 psi for 50 Hz units.

- **Model 89 and Model 90 Unit Procedure**

1. Leaving the lid open, take control of the SYSTEM 1 with the hand terminal and inflate the seal by entering XBY(4002H)=30.
2. Fill drain pan with water by entering XBY(4001H)=249. Allow water to fill the drip pan until water is about 1 ¾" (45 mm) above the drogues. Stop the fill process by entering XBY(4001H)=251.
3. Aim hose into the drip pan and turn on the H.P. pump by entering XBY(4001H)=187. Allow the water to flow until all air has been expelled from the H.P. pump and tubing.
4. Using a 2 L (0.53 gal) liter flask record the time to fill.
5. Turn OFF the H.P. pump by entering XBY(4001H)=251.
6. Connect the tubing to the gauge.
7. Turn ON the H.P. pump by entering XBY(4001H)=187. Record the pressure indicated on the gauge.
8. Turn OFF the H.P. pump and drain the SYSTEM 1 by entering XBY(4001H)=119.
9. Turn OFF the compressor by entering XBY(4002H)=28.
10. Deflate the seal by entering XBY(4001H)=254.
11. De-energize SOL2 by entering XBY(4001H)=255.
12. Enter ROM.
13. Enter RUN.
14. Remove test hardware from SYSTEM 1.

- **Model 99 Unit Procedure**

1. Leaving the lid open, enter the service mode. Select TESTS, and then select VALVES.
2. Inflate seal by turning ON s1 (SOL1).
3. Close drain pinch valve by turning ON s4 (SOL4).
4. Fill drain pan with water by turning ON s7 (SOL7). Allow water to fill the drip pan until water is about

1 ¾" (45 mm) above the drogues. Stop the fill process by turning OFF s7 (SOL7).

5. Aim hose into the drip pan and turn ON P2. Allow the water to flow until all air has been expelled from the HP pump and tubing.
6. Using a 2 L (0.53 gal) flask, record the time to fill.
7. Turn OFF P2.
8. Connect the tubing to the gauge.
9. Turn ON P2. Record the pressure indicated on the gauge.
10. Turn OFF P2.
11. Drain SYSTEM 1 by turning OFF s4 (SOL4) drain pinch valve solenoid, and turning ON P1, circulation pump. Turn OFF P1 once the water level reaches the top of the drogues. It will be necessary to manually drain the remaining water using a cup.
12. Turn OFF s1 (SOL1).
13. Deflate the seal by turning ON s2 (SOL2). Once deflated, the tray can be re-installed and the SYSTEM 1 removed from service mode.

7.4.5 LS6 Switch Test Procedure

This test procedure checks the operation of the LS6 H.P. pump monitor (pressure switch) under dynamic conditions. Model 89 and Model 90 units require the use of the STERIS hand terminal; Model 99 units require the use of the STERIS Service Access Key.

- **Model 89 and Model 90 Units**

1. Insert tray, and inflate the seal by entering `XBY(4002H)=30`.
2. Fill chamber by entering `XBY(4001H)=249`. Be prepared with the next step to prevent spillover.
3. When chamber is full, stop filling and activate the HP pump by entering `XBY(4001H)=187`.
4. Measure voltage from CN9-4 to CN9-10. Voltage should be 0.005 VDC or less.
5. Monitor LS6 address bus by entering the following:

   ```
   RAM
   10_A=XBY(4000H).AND.4
   20_?A
   30_For I=1TO100:NEXT
   40_GOTO10
   RUN
   ```

6. Monitor bus and voltage for five minutes. The voltage should remain less than 0.005 VDC and the address bus should read 0 counts. Record voltage and counts.
7. Interrupt program with `CTRL-C`.
8. Turn OFF the H.P. pump by entering `XBY(4001H)=251`.
9. Restart the above program by typing RUN and pressing enter. Bus output should be consistently 4 counts.
10. Measure and record the 5 VDC power supply.
11. Measure CN9-4 to CN9-10. Voltage should be same as the power supply +/- 0.1 VDC.
12. Drain chamber by entering `XBY(4001H)=119`.
13. Reset the SYSTEM 1 by entering `XBY(4002H)=28:XBY(4001H)=254`. Wait for the seal to deflate and enter `XBY(4001H)=255`.
14. Unplug the SYSTEM 1.
15. Disconnect CN9 and measure resistance from CN9-4 to CN9-10. Reading of infinite should be obtained.
16. Reconnect CN9 and plug in the SYSTEM 1.
17. Enter `ROM` and enter `RUN`.

- **Model 99 Units**

The H.P. Pump test is found in the Service Mode by selecting TESTS, then MORE, then HPP TEST. Selecting HPP TEST with the lid closed will start an automated sequence where the SYSTEM 1 is filled with water and the H.P. pump runs. The display will show CLSD if the switch is activated or OPEN if the switch is not activated. When the pump is running, the switch should be CLOSED. At the conclusion of testing, press SAVE VALUES and the unit will automatically drain and return to the main Service Mode menu.

7.4.6 Seal Leak Test and Compressor Output Test

Model 89 and Model 90 Units

1. Connect pressure gauge to seal relief port at rear of the SYSTEM 1.

NOTE: If the SYSTEM 1 does not have a seal relief port, then disconnect the hose from the air manifold to the circulation pinch valve solenoid (SOL3) and place meter there. The circulation pinch valve solenoid must be energized during the test. `XBY(4001H)=247`.

2. Inflate the seal, using command:

   `XBY(4002H)=30 <ENT>`.

Check for leaks at fittings using soapy solution. No leaks should be detected before this test is performed.

3. After compressor has turned OFF (via compressor control switch LS5), disable the compressor from restarting, using command:

   ```
   XBY(4002H)=28  <ENT>.
   ```

4. Record pressure reading from pressure gauge.
5. Wait five minutes and then record pressure reading from pressure gauge again.
6. If pressure difference is greater than or equal to 1.0 psi, suspect leaking seal or leaking fittings.
7. Pressure difference of less than 1.0 psi is acceptable operation for SYSTEM 1 in field use.
8. Release air from the SYSTEM 1 by using command:

   ```
   XBY(4001H)=254.
   ```

   Wait 10 seconds for air to exhaust, then enter:

   ```
   XBY(4001H)=255.
   ```

Model 99 Units

1. Connect pressure gauge to seal relief port at rear of the SYSTEM 1.
2. In Service Mode select TESTS, then VALVES, then turn ON s1 (SOL1), which will turn on the air compressor.
3. Check for leaks at fittings. No leaks should be detected before this test is performed.
4. Turn OFF s1 (SOL1).
5. Record pressure reading on gauge.
6. Wait five minutes and record pressure on gauge. A pressure difference of 1.0 psi or less is acceptable.
7. Turn ON s1 (SOL1) to deflate seal and remove test equipment.

7.4.7 Sterile Filter Housing Pressure Hold Test

This test utilizes the sterile filter test plug to test the integrity of the filter housing and associated piping.

NOTE: Verify proper operation of compressor and pressure transducer prior to performing this test.

• Model 89 and Model 90 Units

1. Pressure Hold Test: Remove sterile filter cap, remove filter, suction all water from the housing, install test plug, and re-install cap. Enter the following commands with the hand terminal:

   ```
   XBY(4001H)=223:XBY(4002H)=31 <ENT>.
   ```

2. Unit should reach pressure in two minutes or less (compressor turns off). Allow the pressure to stabilize for five minutes, then enter the following commands:

   ```
   XBY(4002H)=24:XBY(4001H)=211 <ENT>.
   ```

3. Read out the starting pressure by entering the following command:

   ```
   ?XBY(0E005H)<ENT>.
   ```

4. Record the value displayed. Repeat this command and record the pressure value every minute for five minutes. The value should not DECREASE by more than 3 counts in five minutes. Release the pressure from the sterile filter assembly and inflatable seal by entering the following commands:

   ```
   XBY(4002H)=28:XBY(4001H)=254 <ENT>.
   ```

5. Wait 10 seconds for the air to exhaust, then enter:

   ```
   XBY(4001H)=255 <ENT>.
   ```

• Model 99 Units

1. Remove sterile filter cap, remove filter, install test plug, and reinstall cap.
2. In Service Mode select TESTS, then VALVES. Turn ON s1 (SOL1) and s8 (SOL8) to enable compressor. Wait until compressor stops running.
3. Press STATUS button several times until the pressure is displayed. The pressure should be between 35 and 40 psi.
4. Turn OFF s1 (SOL1).
5. Wait five minutes for the pressure to stabilize, then record the start pressure.
6. Every minute for five minutes press the STATUS button until the pressure is displayed and record the pressure.
7. The maximum allowable pressure difference between start and finish pressure is 0.120 psi.

7.4.8 Sterile Filter Membrane Test

The test for determining if the filter membrane is acceptable or not is the Diagnostic test. The Model 99 unit has an abbreviated test that can be run in the Service Mode that can save time over the standard Diagnostic test. Select MFG SF HOLD, then press SAVE VALUES touch pad. This test is a quick test of the integrity of the sterile filter. The chamber will fill, drain, and the housing will be pressurized with air. The start pressure will be printed along with the end pressure after one minute. All values are in "psi" and acceptable pressure difference with an A1525 filter is 0.46 psi or less.

NOTE: During a normal DIAGNOSTIC cycle, the test is for five minutes. The control allows the following pressure drops:

FILTER PRESSURE DROP	
A1525	*2.30 psi*
A1505	*1.64 psi*
A1502	*1.48 psi*

In this SF HOLD TEST, the test is only for one minute, so the allowable pressure loss is 1/5 of the above values. Also note these pressure drops are equivalent to the "counts" value in the earlier model SYSTEM 1.

Printer will print "FACTORY TEST".

Select MFG, then press SAVE VALUES touch pad.

At the end of the test, the display reverts to the Service Main Menu. Printer prints First Pressure, Second Pressure and Pressure Differences. See printout example, below:

```
           SF HOLD
        ______________

FIRST PRESSURE  = XX.XX

SECOND PRESSURE
= XX.XX

PRESSURE DIFF   =00.XX
```

Printout Example from Automated Sterile Filter Membrane Test

7.4.9 CK8 Test

This test can be used to determine the set point of CK8.

- **Model 89 and Model 90 Units**

1. Turn ON air-water solenoid valve s8 (SOL8) by entering XBY(4001H)=223.
2. Turn compressor ON by entering XBY(4002H)=30.
3. After compressor stops, turn compressor OFF by entering XBY(4002H)=28.
4. Turn OFF S8 (SOL8) by entering XBY(4001H)=255.
5. Enter ?XBY(0E005H). Counts should be >9 but <30.
6. Deflate seal by entering XBY(4001H)=254.
7. Reset the SYSTEM 1 by entering XBY(4001H)=255.
8. Enter ROM and then RUN.

- **Model 99 Units**

This test requires manipulation of components in the VALVES section of the Service Mode.

1. Turn ON s8 (SOL8).
2. Turn ON s1 (SOL1). Compressor will run to compressor control switch (LS5) setting.
3. When compressor has stabilized, turn OFF s1 (SOL1).
4. Turn OFF s8 (SOL8).
5. Press STATUS touch pad, and monitor system pressure. The reading that it stabilizes at is the CK8 setting. Acceptable range is greater than 3.5 psi or less than 11.7 psi. (These values are equivalent to counts of 9 to 30 respectively on the SYSTEM 1 Model 90).

7.4.10 Output Test

This test is used to operate the board outputs.

Model 89 and Model 90 Units

Use the following commands on the hand terminal to operate the associated component:

1. XBY(4001H)=255

   All devices associated with 4001H address OFF.

2. XBY(4001H)=254

   SOL2 ON (seal release solenoid).

3. XBY(4001H)=253

   *SOL7 ON (inlet fill valve).

4. XBY(4001H)=251

   *SOL4 ON (drain pinch valve solenoid).

5. XBY(4001H)=247

SOL3 ON (circulation pinch valve solenoid).

6. XBY(4001H)=239

*SOL5 ON (dump valve).

7. XBY(4001H)=223

SOL8 ON (air-water solenoid valve).

8. XBY(4001H)=191

*P2 ON (high pressure pump).

9. XBY(4001H)=127

P1 ON (circulation pump).

* *NOTE: These components require that LS2 seal pressure safety switch be closed before power can be supplied. The compressor must, therefore, be activated and seal pressurized using address 4002H below:*

1. XBY(4002H)=28

All devices associated with 4002H address OFF.

2. XBY(4002H)=30

Compressor ON and controlled by LS5.

3. XBY(4002H)=31

Compressor ON and controlled by PT1 (SOL8 must also be ON, use address 4001H above).

4. XBY(4002H)=12

Heater (HTR1) ON (chamber must have water and circulation pump ON, otherwise heater failure will occur).

Model 99 Units

Enter the Service Mode, select TESTS, then select VALVES and the following outputs can be operated:

tk – Paper take up
s8 – Air-water solenoid valve (SOL8)
s5 – Dump valve (SOL5)
s3 – Circulation pinch valve solenoid (SOL3)
s4 – Drain pinch valve solenoid (SOL4)
s7 – Inlet fill valve (SOL7)
s2 – Seal release solenoid (SOL2)
s1 – Compressor release solenoid (SOL1) and enable compressor (COMP)
h – Heater element (HTR1)
p1 – Circulation pump
p2 – High pressure pump (HP Pump)

7.4.11 Touch Pad Test

Model 89 and Model 90 Units

Take an ohmmeter and connect common to CN6-1 on the printer/display PC board.

NOTE: Pin 1 on CN6 is the pin nearest CN1. Pin 5 on CN6 is nearest the edge of the PC board. Test each switch in the following way AFTER TURNING POWER OFF:

Put other lead on CN6-2, press START. CN6-4, press Diag. CN6-3, press CANCEL.

Each button press should show resistance of <50 ohm.

Check for shorts between switches by pressing buttons not connected to the switch being tested, and by measuring between switched outputs for no connection.

CN6-2 to CN6-4
CN6-2 to CN6-3
CN6-4 to CN6-3

If the switches check good, check wires/cables and connectors following signals to the controller PC board.

Model 99 Units

In the Service Mode, select TESTS, then CONSOLE, then KEYPAD. This will bring up the keypad test which will indicate a number on the display when the corresponding pad is pressed. If the display does not change when the pad is pressed, it indicates a faulty touch pad.

- CONSOLE

CONSOLE allows checking of the Keypad, Dip Switch settings, and Display.

Select CONSOLE, then press SAVE VALUES touch pad. Display shows:

```
KEYPAD    DIPSW
DISPLAY
```

KEYPAD

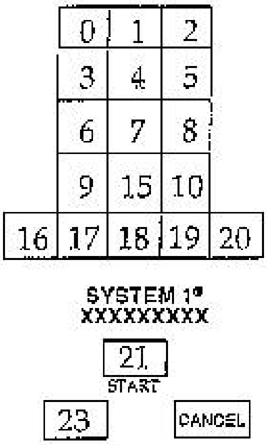
Select **KEYPAD**, then press SAVE VALUES touch pad. Display shows:

*** KEYPAD TEST ***
KEY =

Refer to the illustration below. Press a key on the keypad. If the communication link is OK, the corresponding number on the keypad will display.

NOTE: The CANCEL touch pad will not display a number. The test for the CANCEL touch pad is that it will exit this routine when pressed.

Keypad Test Chart


0
1
2
3
4
5
6
7
8
9
15
10
16
17
18
19
20
SYSTEM 1®
XXXXXXXXX
21
START
23
CANCEL

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Section 8: Troubleshooting

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8.1 STERILE CYCLE FAULTS

8.1.1 Fill Problem

Description – SYSTEM 1® Sterile Processing System senses a full condition in less than 25 seconds or takes longer than five minutes to completely fill.

Action:

If less than 25 seconds to fill:

1. Check LS3.
2. Check that A, B and sterile water filters are in place.

If more than five minutes to fill:

1. Check that water supply is ON.
2. Check that water pressure supplied is within specification.
3. Check that strainer in pressure regulator is clear.
4. A, B, or sterile water filters may be clogged – replace.
5. Drain hose may be restricted – repair.
6. Faulty CK4/inlet screen – clean or replace.
7. Faulty SOL7 solenoid valve – replace.
8. CK2 and CK3 may be stuck closed – replace.
9. Faulty LS3 – replace.
10. Low air pressure – check compressor.
11. Faulty LS5 – replace.
12. Faulty LS2 – replace.
13. Faulty SOL5 – replace.

8.1.2 Heat Problem

Description – SYSTEM 1 takes longer than the allotted time to heat the fluid to 50°C. (The allotted time is determined by inlet water temperature.)

Action:

1. Faulty HTR1 (resistance should be between 10 - 12 ohms) – replace.
2. Heater thermal overload tripped – reset.
3. Faulty SSR1 – replace.
4. Faulty LS2 – replace.
5. Faulty control board – replace.

8.1.3 Temperature Under 50°C

Description – SYSTEM 1 detects fluid temperature of < 50°C during the exposure phase.

Action:

1. Faulty HTR1 – replace.
2. LS1 tripped – reset.
3. Faulty SSR1 – replace.
4. Faulty LS2 – replace.
5. Faulty control board – replace.

8.1.4 Concentration Low

Description – Control measures less than 175 counts during exposure.

Action:

1. No STERIS 20™ Sterilant Concentrate – run cycle again with STERIS 20.
2. STERIS 20 builders/buffers hardened – run cycle again with fresh STERIS 20.
3. Scale build-up on CP1 and CP2 – clean.
4. Faulty CK1 – replace.
5. Faulty CP1 and CP2 connection – repair.
6. Out of calibration – recalibrate (Model 99 units only).
7. Faulty control board – replace.
8. Faulty interface board (Model 99 units only) – replace.

8.1.5 Chamber Level Low

Description – SYSTEM 1 senses a not-full condition during exposure.

Action:

1. Leaking V5 – replace pinch valve sleeve.
2. Faulty SOL4 – repair.
3. Faulty LS3 – replace.
4. Leaking tray – replace.
5. Faulty CK8 – rebuild or replace.
6. Leaking lid – replace.
7. Plumbing leak – repair.

8.1.6 Heater Problem

Description – Control senses temperature difference of more than 7°C between TC1 and TC2.

Action:

1. Clean tray drain strainer.
2. Faulty P1 – replace.
3. Faulty SSR4 – replace.
4. Faulty TC1 or TC2 – repair.
5. Faulty TC1 or TC2 – replace.
6. TC1 or TC2 out of calibration – recalibrate (Model 99 units only).
7. Faulty interface board – replace (Model 99 units only).
8. Faulty control board – replace.

8.1.7 Chamber Open

Description – Control senses lid is open during cycle.

Action (If lid remains closed, yet alarm occurs):

1. Faulty LS4 – replace.
2. Loose connection at LS4 – repair.
3. Incorrect adjustment of latch flag assembly – readjust.

Action (If lid physically opens during cycle):

1. Incorrect latch bar adjustment.

8.1.8 Temperature Over 60°C

Description – Control senses temperature over 60°C anytime during cycle.

Action:

1. If during fill phase (including rinse fills) – facility water supplied too hot, reduce temperature.
2. If after fill phase – faulty HTR or SSR1 – replace.
3. Defective control board – replace.

8.1.9 Temperature Problem

Description – Sensor on control board sees temperature < 13°C or > 50°C (Model 89 and Model 90 units) or < 13°C or > 65°C (Model 99 units).

Action:

1. Correct room temperature if out of specification.
2. Replace control board if room temperature OK.
3. Defective cooling fan – replace (Model 89 and Model 90 only).

8.1.10 Power Failure

Description – Loss of power during cycle.

Action:

1. Check customer incoming power – report problem to customer.
2. Check internal power connections as follows (Model 99 only):
   a. Check all connections. Pay particular attention to the 120VAC connections to the line filter, 120VAC wires out of the line filter to the connection on the power supply, cable from the power supply to the interface board, P1 and P2 on the interface board to P10 and P11 on the control board. Remove the connections, plug and unplug the connector a couple of times, apply anti-fretting compound (P/N 764329907) to the pins and sockets, then reconnect. If this does not fix the power failure problem, continue with the next step.
   b. Check the 5 VDC at the P10 connector between pins 1 and 3. The voltage should be 4.9-5.1 VDC and steady. If the voltage is steady and the unit is still having power failures, go to step d. If voltage is not correct, continue with next step.
   c. If the voltage to the control falls below 4.8 VDC, the unit will reset. This drop in voltage can be

8.1.10 Power Failure (cont.)

caused by loose connections or a bad power supply. To isolate the problem, check the unit as follows:

1. Check the 5 VDC at the P2 connector between pins 1 and 4. If the voltage is 4.9-5.1VDC and steady at the P2 connector, the DC power cable (P/N 146665365) is loose or defective. Check connections and replace if necessary. If voltage is not correct, continue to next step.
2. Check 5 VDC at the P1 connector between pins 1 to 4, 2 to 5, and 3 to 6. All voltages should be 4.9-5.1 VDC and steady. If they are not correct, there is a loose or bad cable from the power supply, or the power supply is bad. Replace defective component.

d. If the 5 VDC voltages are correct, the problem may be with the control board. To verify the problem, power down the unit, and disconnect cables P12, P5B and P8 from the control assembly. Leave P10 and P11 connected. Power up unit; if unit still goes into power failure, the control board is defective and should be replaced.

3. Faulty power supply– replace.

8.1.11 H.P. Pump Failure

Description – Pressure switch LS6 monitors the pump output under pump ON and OFF conditions. Should LS6 sense incorrect operation, an alarm occurs.

Action:

1. Quick Connects installed improperly– refer to operating instructions.
2. Wrong tray adapter used – refer to operating instructions (e.g., C1315 adapter to be used on C1220 and C1140 trays).
3. Faulty scope – test with known good scope.
4. Faulty LS6 – replace.
5. Erratic operation of LS6 – relocate from pump mount to plumbing mount (Model 89 and Model 90 units only). Contact STERIS for kit part number.
6. Faulty P2– test flow rate and output pressure, replace if out of specifications.
7. Incoming water pressure out of specifications – repair.
8. Tubing under tray obstructed – replace.

8.2 DIAGNOSTIC CYCLE FAULTS

8.2.1 A/D Converter Fault

Description – Model 89 and Model 90 units: Control monitors the ground circuit and 5 VDC circuit. If ground circuit reads higher than 0.117 volts, or if 5 VDC circuit reads less than 4.778 volts, alarm occurs. Model 99 units: Control monitors a fixed resistor for known values.

Action:

1. Check wiring connections at power supply and control board – repair.
2. Faulty power supply – replace.
3. Faulty control board – replace.

8.2.2 Inlet H_2O Temp < 43°C

Description – Control monitors TC3 drain block during the water dump phase. Temperature must be $\geq$ 43°C or alarm will occur.

Action:

1. Check that water supply is ON.
2. Facility water temperature is < 43°C – correct.
3. Faulty control board – replace.
4. Faulty TC3 – replace on Model 89 and Model 90 units; on Model 99 units, recalibrate.
5. Faulty SOL5 – replace.
6. Low air pressure – check compressor/LS5 air piping components.
7. Faulty LS2 – replace.

8.2.3 Fill time > 3 Minutes

Description – Control monitors LS3 from start of fill. If full condition is not sensed within three minutes, alarm will occur.

Action:

1. Water pressure too low – correct (refer to Section 2 for specifications).
2. Filters plugged – correct.
3. Restriction in drain hose – correct.
4. Faulty SOL7 fill valve – replace.
5. Faulty CK4/strainer – repair or replace.
6. Faulty CK2 and or CK3 – replace.
7. Faulty V5 – repair.
8. Faulty SOL4 – replace.
9. Faulty SOL5 – replace.
10. Faulty LS3 – replace.
11. Faulty LS2 – replace.

8.2.4 Pressure Transducer Fault

Description – Control monitors fill pressure (FP) and fill zero (FZ). If FP < 5.85 psi or if FZ is > 1.17 psi, alarm will occur.

Action:

If printout shows inlet < 5.85

1. Water pressure too low – correct.
2. Filters plugged – replace.
3. Faulty SOL7 fill valve – replace.
4. Faulty CK4/strainer – repair or replace.
5. Faulty PT1 – recalibrate or replace.
6. Floatblock not drained from previous cycle – drain and re-test.
7. Faulty LS3 – replace.

If printout shows zero > 1.17

1. Faulty PT1 – recalibrate or replace.
2. Faulty CK2 and or CK3 – replace.
3. Faulty sterile water filter – replace.

8.2.5 Circulation Pressure Low

Description – Control monitors circulation pressure (CP) and fill zero (FZ) and performs a calculation. If CP < (1.073 psi [2.75 counts] + FZ), alarm will occur.

Action:

1. Incomplete tray being run (no container or lid) – retest with complete tray.
2. STERIS 20 being run – run without STERIS 20.
3. Drain screen plugged – clean.
4. Faulty CK2 and/or CK3 – replace.
5. Faulty P1 – replace.
6. Faulty SSR4 – replace.
7. PT1 fault – repair.
8. V5 – repair.

8.2.6 Thermocouple Failed

Description – Control monitors TC1 and TC2 and alarm will occur if readings are more than 3°C apart.

Action:

1. Loose connection to TC1 or TC2 – repair connection.
2. Faulty TC1 or TC2 – replace.
3. Out of Calibration – recalibrate (applies to Model 99 units only).
4. Faulty interface board (Model 99 units) only – replace.
5. Faulty control board – replace.

8.2.7 Circulation Valve Fault

Description – Control monitors circulation pressure (CP) and pressure with circulation pump (P1) on and circulation valve closed (CZ). Alarm will occur if CP-CZ < 0.975 psi (2.5 counts).

Action:

1. V5 leaking – replace.
2. Incomplete tray being run (no container or lid) – retest with complete tray.
3. PT1 fault – repair.

8.2.8 Heat Rate Low

Description – Control monitors temperature rise of fluid during heating phase. Alarm will occur if temperature does not rise an average of 1.0°C per minute.

Action:

1. Faulty HTR1 – replace.
2. LS1 tripped – reset.
3. Faulty SSR1 – replace.
4. Faulty control board – replace.

8.2.9 Drain Valve Fault

Description – Control monitors LS3 just prior to draining the chamber. If LS3 switch does not sense a full condition, alarm will occur.

Action:

1. Chamber leak through cracked tray – replace tray.
2. Faulty V5 – replace.
3. Faulty LS3 – replace.
4. Faulty CK8 – rebuild.
5. Plumbing component leak – repair.

8.2.10 Drain Time Fault

Description – Control monitors the LS3 after the unit starts draining. If LS3 does not sense a not-full condition within five seconds, alarm will occur.

Action:

1. Clogged FLT2 – replace.
2. Faulty CK1 – replace.
3. Drain hose restricted – repair.
4. Faulty V5 – replace.
5. Faulty LS3 – replace.

8.2.11 Concentration Monitor Failed

Description – Control checks concentration monitor circuit and compares to calculated values, alarm will occur if below set value.

Action:

1. Faulty CK1 – replace.
2. Scale buildup on CP1 and CP2 – clean.
3. Faulty control board – replace.
4. Other (Model 99 units only):

   The concentration reading is monitored while the unit is full and water is warm from the Heat Rate Test. The control records the high reading at this time. While the unit is draining during the drain and HP pump tests, the control watches the concentration and records the low reading. (The HP pump is left on while draining to help blow out the high pressure transition block.) If the difference between the high and low reading is not at least three counts, the test fails.

   A failure of this test can be caused by low conductivity water, failure of the unit to drain properly, or defective component. Use the following troubleshooting guide to determine cause.

   Look at the printout for the following:

   ```
   CONC. MONITOR FAILED
   MINIMUM          X
   SHOULD READ      X
   ```

   The 'MINIMUM' is the lowest reading that the unit recorded during the test. The reading must be three counts less than the high reading. The 'SHOULD READ' is the minimum reading the control expected to see HIGH READING – 3 COUNTS.

   Example:

   ```
   CONC. MONITOR FAILED
   MINIMUM          56
   SHOULD READ      55
   ```

   This means that the high reading was 58 counts (SHOULD READ +3 counts) and the lowest reading that the unit saw was 56 counts. The test failed since the low reading was not three counts less than the high reading. To troubleshoot the problem, first verify that the control is functioning properly as follows:

   Unplug CN9 from the interface board and enter the service mode. Go to CALIB menu and select the VIEW option. Under the VIEW menu, select CONC to view the concentration counts. First, place a jumper between TP1 and TP2 on the interface board. The counts displayed should be approximately 170. Next, place the jumper between TP1 and TP3 on the interface board. The counts displayed should be approximately 117. If the readings are more than 5 counts off on either reading, re-calibrate as per maintenance manual and re-verify readings. If the

8.2.11 Concentration Monitor Failed (cont.)

above readings are correct, then the fault is mostly a failure of the unit to drain completely. Troubleshoot a drain problem remembering that the H.P. pump is running during the drain portion of the diagnostic to help remove water from the high pressure transition block.

If the Concentration Monitor Test fails with the following printout (MINIMUM value prints 0):

```
CONC. MONITOR FAILED
MINIMUM         0
SHOULD READ     -5
```

It could be due to low conductivity water being supplied to the unit such that the conductivity differential requirements is not being satisfied.

Verify the control is functioning properly as described above. If it is, order and install the latest revision Model 99 SYSTEM 1 chip set. Revision 5 and higher will compensate for low-conductivity water.

8.2.12 Sterile Filter Membrane Fault (without numbers)

Description – The sterile filter housing is pressurized. The pressure must reach >40 psi in five minutes or the alarm will occur. If this portion passes, the housing pressure is maintained for five minutes. After this five-minute stabilization period, the pressure must be >37.83 psi or the alarm will occur. If this portion passes the control waits 15 seconds and checks the sterile filter housing pressure again. The pressure must be >36.73 psi and <43.75 psi or the alarm will occur.

Action:

1. Air leak – repair.
2. Faulty COMP – replace.
3. PT1 out of calibration – recalibrate.
4. PT1 – replace.
5. Faulty FLT1 – replace.
6. Faulty CK4 – replace.
7. Faulty CK6 – replace.
8. Faulty sterile filter housing – repair/replace.

8.2.13 Sterile Filter Membrane Fault (with numbers)

Description – A five-minute hold test is performed. The pressure in the sterile filter housing is monitored for five minutes. During this five-minute hold period, if the pressure drop exceeds the allowable setting for the sterile water filter type, an alarm will occur. Three numbers will be printed; start pressure, finish pressure and the elapsed time of the failure (seconds). Pressure prints are in counts on Model 89 and Model 90 units. Pressure prints are in psi on Model 99 units.

Action:

1. Faulty FLT1 – replace and rerun test.
2. Air leak – repair.
3. Faulty SOL8 – replace.
4. Faulty sterile filter housing – replace.
5. PT1 out of calibration – recalibrate.
6. Faulty PT1 – replace.

8.2.14 Drain Check Fault

Description – At end of diagnostic cycle, pressure in sterile filter housing is vented through CK8 to check cracking pressure. Pressure must be as follows or alarm will occur.

Model 89 and Model 90: 9 counts <pressure<30 counts

Model 99: 3.51 psi<pressure<11.7 psi

Action:

1. Faulty CK8 – replace.
2. Drain line restriction – repair.
3. Faulty PT1 – repair.

8.2.15 Ambient Temperature Fault

Description – A sensor on the control board monitors ambient room temperature and alarm will occur if temperature measured is > 50°C (Model 89 and Model 90 units), > 65°C (Model 99 units) or < 13°C (all units).

Action:

1. Room temperature out of specification – resolve.
2. Faulty cooling fan (Model 89 and Model 90) – replace
3. Faulty control board – replace.

8.2.16 Lid Open Fault

Description – Control monitors lid switch for open condition during cycle. If open is sensed, alarm will occur.

Action:

1. Faulty LS4 – replace.
2. Loose connection at LS4 – repair.
3. Incorrect adjustment of latch flag assembly – readjust.

8.2.17 H.P. Pump Fault

Description – Pressure switch LS6 monitors the pump output under pump ON and OFF conditions. Should the switch sense incorrect operation, an alarm will occur.

Action:

1. Wrong tray adapter used – refer to operating instructions (e.g., C1315 adapter to be used on C1220 and C1140 trays).
2. Faulty LS6 switch – replace.
3. Erratic operation of LS6 – relocate from pump mount to plumbing mount. (Model 89 and Model 90)
4. Faulty P2 – test flow rate and output pressure, replace if out of specifications.
5. Tubing under tray obstructed – replace.
6. Incoming water pressure out of specification – repair.

8.3 OTHER FAULTS

8.3.1 Ground Fault Interrupt (GFI) Trip

Description – A GFI measures the difference in current flow between the hot and neutral lines of a circuit. Normally both will be identical; however, if there is current leakage to ground from the hot line, the GFI senses the imbalance and "trips."

The typical trip point of a GFI is 4 to 6 mA, and since this is a very small level of imbalance, it will require component isolation to locate the cause.

Establish if the GFI trips as soon as the unit turns on, or if it occurs in cycle. If trip occurs when turned on, it may be necessary to isolate components one at a time. When doing so, turn the unit on to see if the GFI trips. If trip occurs in cycle, the trip may be occurring when a specific component is energized; if so, use the service mode/hand terminal to manually activate individual components until the source of trip is located.

Action:

1. Verify proper operation of GFI using ground fault tester – if OK, continue with component isolation, otherwise, replace GFI.
2. If trip occurs in cycle – use service mode/hand terminal to operate components individually until trip source is located.
3. If trip occurs when powered up – isolate individual components manually until fault is located.

8.3.2 Water Spills from SYSTEM 1

Action:

Check the following items:

1. Drip pan full of water?
2. Is chamber filling?
    a. Faulty LS3 – repair.
    b. SOL5 or SOL7 leaking – repair.
    c. Are instruments loaded OK – reload.
    d. Is water pressure >50 psi – reduce.
    e. Backpressure in the drain – repair.
    f. CK2, CK3 OK – repair.
    g. Header block – replace lid.

8.3.3 Printer Faults (Model 89 and Model 90 units only)

Action:

Check the following items.

1. Does printer print OK?
    a. Proper paper.
    b. PC Board connections OK?
    c. PC Board OK?
    d. Is paper inserted correctly?
    e. Is paper feed working?
    f. Is there a paper jam?
    g. Is sterile filter housing cap interfering with paper roll?
    h. Check connections and paper feed motor and RESTART.

8.4 MODEL 99 CONTROL FAULTS

Fault	Description	Service Instructions
8.4.1 Printer Prints: ROM FAILURE	Read Only Memory (ROM) Failure. Occurs if memory fails Cyclic Redundancy Check (CRC) test. Prints only in DIAGNOSTIC Cycle.	1. Program chips defective. Replace chips. 2. Main control board failure. Replace board.
8.4.2 Printer Prints: RAM FAILURE	Random Access Memory (RAM) Failure. Occurs if memory fails memory tests. Prints only in DIAGNOSTIC Cycle.	1. Main control board failure. Replace board.
8.4.3 Printer Prints: RTC FAILURE	Real Time Clock (RTC) Failure. Occurs if microprocessor clock does not agree with RTC within allotted time (five minutes).	1. Main Control board failure. Replace board.
8.4.4 Printer Prints: TC1 FAILURE	Occurs if the inlet thermocouple reading is greater than 75°C or less than 0°C in DIAGNOSTIC Cycle.	1. Check TC1 for loose connections or broken wires. 2. Check analog cable connections. 3. Re-enter known good calibration values. 4. Defective TC1. Replace. 5. Defective interface board. Replace board.
8.4.5 Printer Prints: TC2 FAILURE	Occurs if the outlet thermocouple reading is greater than 75°C or less than 0°C in Diagnostic Cycle.	1. Check TC2 for loose connections or broken wires. 2. Check analog cable connections. 3. Re-enter known good calibration values. 4. Defective TC2. Replace. 5. Defective interface board. Replace board.

Fault	Description	Service Instructions
8.4.6 Printer Prints: TC3 FAILURE	Occurs if the drain block thermocouple reading is greater than 75°C or less than 0°C in DIAGNOSTIC Cycle.	1. Check TC3 for loose connections or broken wires. 2. Check analog cable connections 3. Re-enter known good calibration values. 4. Defective TC3. Replace. 5. Defective interface board. Replace board.
8.4.7 Printer Prints: CHM-PRES NOT CALIBRATED	Indicates PT1 has not been calibrated or calibration data lost and default values are being used.	1. Calibrate the PT1. 2. Re-enter known good calibration values. 3. Defective battery-backed RAM. Replace RAM.
8.4.8 Printer Prints: INLET NOT CALIBRATED	Indicates TC1 (inlet thermocouple) has not been calibrated or calibration data lost and default values are being used.	1. Re-enter known good calibration values. 2. Calibrate TC1. 3. Defective battery-backed RAM. Replace RAM.
8.4.9 Printer Prints: OUTLET NOT CALIBRATED	Indicates TC2 (outlet thermocouple) has not been calibrated or calibration data lost and default values are being used.	1. Re-enter known good calibration values. 2. Calibrate TC2. 3. Defective battery-backed RAM. Replace RAM.
8.4.10 Printer Prints: DRN-BLK NOT CALIBRATED	Indicates TC3 (drain block thermocouple) has not been calibrated or calibration data lost and default values are being used.	1. Re-enter known good calibration values. 2. Calibrate TC3. 3. Defective battery-backed RAM. Replace RAM.

Fault	Description	Service Instructions
8.4.11 Printer Prints: CONC. NOT CALIBRATED	Indicates concentration monitor has not been calibrated or calibration data lost and default values are being used.	1. Calibrate the concentration monitor. 2. Re-enter known good calibration values. 3. Defective battery-backed RAM. Replace RAM.
8.4.12 Printer Prints: FLASH VALUES RESTORED	Flash Memory Parameters Restored. Occurs on power-up if battery-backed RAM values are lost. RAM is initialized. Flash ROM values are restored.	1. Battery Backed RAM failure. Replace RAM. 2. Main control board failure. Replace board.
8.4.13 Printer Prints: FLASH VALUES SAVED	Flash Memory Parameters Saved. Occurs on power-up if ROM values are lost. RAM values are saved to Flash ROM.	1. Program chips defective. Replace chips. 2. Main control board failure. Replace board.
8.4.14 Printer Prints: FLASH VALUES LOST. PLEASE REPROGRAM	Flash Memory Parameters Lost. Occurs on power-up if both ROM values and the battery-backed RAM values are lost. Factory defaults are loaded. RAM values are saved to Flash ROM.	1. Battery-backed RAM defective. Replace RAM. 2. Program chips defective. Replace chips.
8.4.15 Printer Prints: **LOW BATTERY** PLEASE REPLACE	Occurs if battery voltage is below minimum range.	1. Battery-backed RAM defective. Replace RAM. 2. Main control board failure. Replace board.
8.4.16 Printer Prints: KEY X ERROR Where X is the defective keypad pushbutton. Reference page 5-12 for map of keypad.	Occurs if keypad pushbutton is closed on power up.	1. Touch pad defective. Replace. 2. Key pressed during power up. Do not press any keypad pushbuttons during power up.

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Section 9: Component Replacement and Repair

9.1 LID REPLACEMENT/SHIMMING PROCEDURE

Equipment, Fixtures, Special Tools:

1. P/N 450100 Roll Pins (as required, up to 3)
2. Loctite Thread Lock (as required)
3. 5/32" Cobalt Drill Bit
4. Lid Spacer Kit (P/N 200273)
   Includes: Four Spacers (P/N 100707)
   Four Shims (P/N 100706)
5. Feeler gauge

Procedure:

1. Disconnect line cord from outlet; depressurize the inlet water line and disconnect water lines (inlet and drain).
2. Remove tray and remove remaining water in drip pan.
3. Siphon water from both quick-disconnect (QD) posts and install caps on all three posts.
4. Flip unit over and remove the four feet and two screws that hold the shroud on.
5. Remove shroud and flip unit back over.
6. Disconnect the #6 clamp that holds the black hose to the float block.
7. Pull the black hose off the float block and let it hang.
8. Remove the retaining ring on bottom of gas spring cylinder and remove the 8-32 set screw in lid that locks the clevis pin.
9. Thread an 8-32 screw into the threaded hole of the clevis pin. With the lid open and held with the right hand, pull the clevis pin out by the screw head (8-32) with the left hand.
10. Remove the gas spring cylinder and close lid.
11. Remove the four 10-32 x 1/2" socket head screws from the hinges. Using a screwdriver, pry the hinges away from the frame. (Sometimes the spacer and roll pin will stay with the hinge and sometimes the spacer and roll pin will stay on the frame.)
12. Once the hinges are free from the frame, move the latch handle to open and remove the lid from the unit.
13. Place four 0.250" thick spacers (P/N 100707) and four 0.060" shims (P/N 100706) equally spaced around the four sides of seal. These spacers slip over the seal and seal retainers.
14. Set the new lid on the unit and install four bolts into hinges; use Loctite on the bolt threads. If holes for roll pins are aligned, then reinstall roll pins through the hinges, shims, and into frame and tighten. If holes for roll pins are not aligned, then new holes for the roll pins will have to be drilled into frame through the second set of holes in the hinges.
15. Check the latch bar adjustment. There should be <0.020" gap between the latch hooks and latch pawls. There also should be no gap between the front of the pawls and the back of the latch hook on both sides. Refer to Figure 9-1.

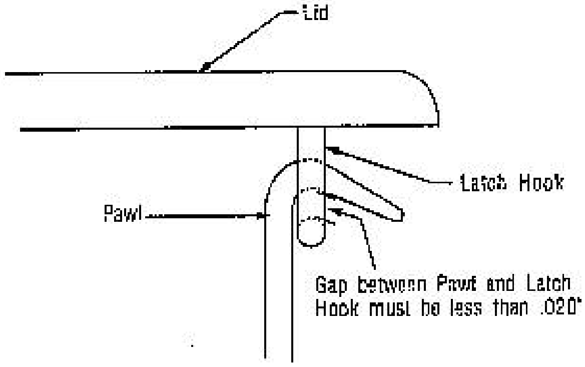


Figure 9-1

16. Remove lid spacer kit and install tray. Inflate and deflate seal. Recheck gap and adjust if over 0.20".
17. To readjust the latch bar:
    a. Remove the four bolts from the latch bar brackets. Remove the two roll pins. Reinstall the four bolts through the latch bar brackets and only tighten bolts finger tight.
    b. Lower the latch brackets so that the latch hooks are just touching the pawls of the latch handle. Be sure there is no gap between the front of the pawls and the back of latch hooks on both sides. Use latch shim (P/N 100362) to move latch bar to front or rear. Do not use more than two shims; shims can be placed on only one side. Do not pry or bend latch hooks.

c. Remove the four bolts on the latch bar brackets and apply Loctite to the threads. Reinstall bolts and tighten. Recheck the latch bar adjustments.

d. Re-drill the roll pin holes, using the second set of holes.

e. Open lid and close it slowly until latch hook touches the top of the latch pawls. The latch hook should touch the latch pawl on its sloped edge. If the latch bar does not touch as it should, use the set screw on the latch bar to adjust the latch bar's travel.

18. Once lid is adjusted and all screws are tightened, install the gas cylinder from bracket on frame to lid and insert the clevis pin into gas cylinder. Adjust lid opening speed with clevis pin.
19. Install retaining ring on bottom of gas cylinder; tighten set screw into lid to lock clevis pin in place.
20. Install black hose on float block assembly and tighten hose clamp.
21. Close lid and make sure the latch flag is still in adjustment.
22. Flip unit over and install shroud.
23. Once shroud is installed, flip unit over and install water lines (drain and inlet), plug unit back into power source. Run test cycles and check for leaks.

9.2 LID SWITCH AND LATCH FLAG ADJUSTMENT PROCEDURE

Equipment, Fixtures, Special Tools:

1. Voltmeter (VOM) with micro clip leads
2. One 0.020″ shim
3. One 0.060″ shim
4. Feeler gauge if 0.20 and 0.60 shim not available

Procedure:

1. Remove power cord from wall receptacle.
2. Turn off water supply to the SYSTEM 1® Sterile Processing System, depress red button to relieve pressure at pre-filter housing.
3. Disconnect drain hose from the back side of the SYSTEM 1 and install cap.
4. Disconnect inlet water hose from the back side of the SYSTEM 1 and install cap.
5. Remove adapter tray from inside cavity of the SYSTEM 1 and set aside.
6. Siphon water from both QD posts and install caps on all three posts.
7. Turn unit upside down, then remove the four feet and two screws on back side securing lower shroud to frame and set aside.
8. Remove shroud from the SYSTEM 1 and set aside.
9. Turn the SYSTEM 1 upright and plug power cord into wall receptacle.
10. Remove cover from control interface box and set aside.
11. Connect VOM to Pin 10 (Ground) and Pin 6 on CN9 Connector. (Open will read 5V.)
12. Visually examine that the connector is connected to limit switch.
13. Visually examine latch flag assembly for damage. Latch flag should be approximately parallel to the latching hook (see Figure 9-2).

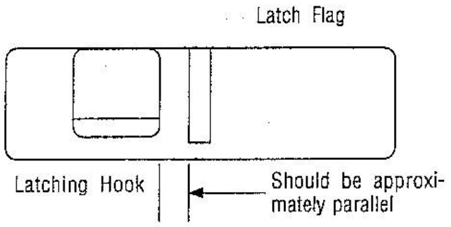


Figure 9-2

NOTE: Top view looking down through slot left side.

14. With lid assembly closed, connect the VOM to Pin 10 and Pin 6 on CN9 connector.
15. Insert 0.020″ thick shim between latch pawl and latch hook. Voltage reading should be zero.
16. Without removing 0.020″ thick shim, insert an additional 0.060″ (total 0.080″) thick shim. Voltage reading should read 5 V.

NOTE: If STEP 15 and 16 are not met, re-adjustment of the latch flag must be made.

17. See Figure 9-3. Bend leg (1) until flag edge (2) will touch 0.020″ shim installed and leg (1) will touch pin.

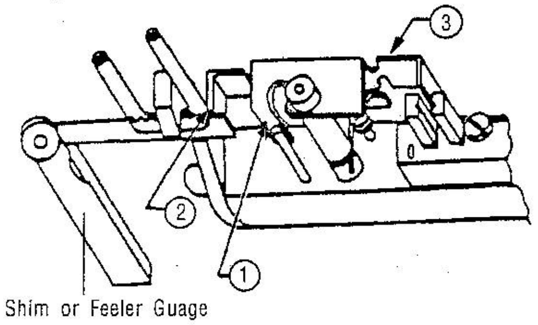


Figure 9-3

18. See Figure 9-3. Insert 0.060" shim (Total 0.080") between latch pawl, latch hook and flag edge (2). Voltage should read 5 V. If not, bend leg (3) away from sensor, flag edge (2) is touching shims, and leg (1) is touching pin.
19. Remove shims from assembly.
20. Remove VOM from CN9 connector.

NOTE: Be sure when turning unit that control side is always up to prevent water entering control.

21. Turn unit upside down; install shroud with four feet and two screws securing shroud to frame.
22. Turn unit right side up; position with respect to inlet water and drain hose.
23. Remove caps previously installed, and re-connect inlet water hose to the plastic valve fitting and the drain hose to the brass male fitting on opposite side.
24. Re-install lid on electronics control box.
25. Plug unit into wall receptacle and run test cycles.

9.3 ASPIRATOR ASSEMBLY LEAK TEST PROCEDURE

Equipment, Fixtures, Special Tools:

1. Container with approximately 6" (152 mm) of water.
2. Length of 1/8" tubing (approximately 12" (305 mm).
3. 50 cc syringe.

Procedure:

1. Remove aspirator to be tested from tubing on adapter tray.
2. Install 1/8" tubing onto the aspirator's 90° elbow and attach other end of tubing to syringe.
3. Plug orifice on end of aspirator probe with finger.
4. Submerge top of aspirator in water.
5. Using syringe, force air into aspirator and check for leaks, air bubbles. If leaks occur, aspirator should be replaced.

9.4 ADAPTER TRAY LEAK CHECK PROCEDURE

Procedure:

1. Determine if leak is actually from adapter tray.
   a. Check header block for leaks.
      1. Place a dry paper towel between drip pan and lid directly under header block.
      2. Run sterile cycle.
      3. Remove towel before releasing seal. Towel should be dry.
      4. If not dry, locate leak in header block area and repair.
   b. Check anti-siphon check valve(CK10) for leaks.
      1. Disconnect outlet of CK10 and place end of tubing into small container to catch water.
      2. Run sterile cycle (complete cycle with four rinses).
      3. Check for water leaking from tubing.
      4. If there is a leak, then replace CK10.
   c. Check for leaks around lid seal.
      1. Dry off edges of adapter tray and drip pan.
      2. Close lid.
      3. Slip paper towels between lid and drip pan until they touch inflatable seal. Do this all the way around lid.
      4. Run complete sterile processing cycle.
      5. Remove towels and check for moisture. Do this before releasing inflatable seal. If moisture is present, lid seal is leaking.
   d. Verify adapter tray leak.
      1. Remove water from drip pan and dry with towel.
      2. Run complete sterile processing cycle.
      3. After cycle, remove tray and measure quantity of water; allowable is 50-100 cc.
      4. Repeat using other container trays.
2. Locate leaks in adapter tray.
   a. All types of adapter tray leaks.
      1. Check for loose hoses.
      2. Check for loose drogue fittings.
      3. Check for adapter tray binding when installing or removing.
      4. Check QD post.
   b. Check for leaks caused by bad glue joints or cracks.
      1. Visually inspect bottom of tray for cracks in casting and cup cutter base. Pay special attention to the area around the cup cutter base.
      2. To locate bad glue joints or cracks that are not visible:

a. Run sterile cycle.

b. When STESTEM 1 is draining, cover air inlet hole on air filter.

c. Watch for air bubbles entering chamber. This will indicate source of leak.

d. Once leak source has been found, uncover air inlet hole and allow SYSTEM 1 to drain.

c. Check HP tubing on adapter tray. The tubing may have a small tear at the 90 degree tubing connector on HP drogue.

9.5 LID SEAL SANDING PROCEDURE

General

If upper seal sticks to the adapter tray after completion of a SYSTEM 1 operation cycle (DIAGNOSTIC or sterile), check for sticking CK1 or clogged sterile air filter. Otherwise, implement this procedure.

Equipment, Fixtures, Special Tools:

Medium grit (150) or similar grade sandpaper.

Procedure:

1. If upper seal is sticking to adapter tray, sand top face at rear splice area lightly to roughen finish.
2. If sticking persists, lightly sand entire face surface.
3. During retest, check for water leaks between upper seal and adapter tray.
4. If after sanding entire face surface sticking persists, troubleshoot unit for another possible problem. This may include the replacement of the sticking upper seal.

9.6 PINCH VALVE SLEEVE REPLACEMENT PROCEDURE

Procedure:

1. Turn off power and water supply to SYSTEM 1.
2. Turn SYSTEM 1 over and remove drip pan.
3. Using a strap wrench or similar tool, loosen the caps on both ends of the pinch valve. Remove body from SYSTEM 1.
4. Remove old pinch valve sleeve.
5. Clean body and caps of any foreign matter.
6. Install new sleeve into valve body.
7. Apply Dow-Corning 111 or similar O-ring lubricant to both faces of the sleeve.
8. Install body and hand-tighten both caps. Caps are fully tight when a 0.030" gap (use a feeler gauge) is present between the cap and the body. See Figure 9-4.
9. Turn SYSTEM 1 over and run a test cycle. If no leaks are observed, install shroud and place unit back into service.

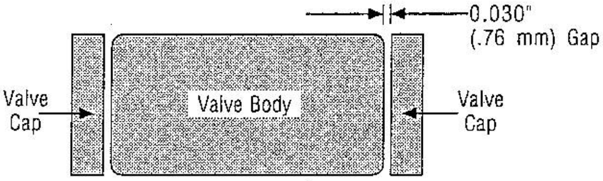


Figure 9-4.

9.7 CONCENTRATION PROBE CLEANING

Equipment, Fixtures, Special Tools:

1. vinegar
2. Scothbrite Pad

Procedure:

Scale or concentration probes may be cleaned in one of two ways:

1. Pour vinegar into port and allow to sit for 15 minutes.
2. Remove probes and clean with Scotchbrite pad. Reinstall.

9.8 COMPRESSOR OUTPUT TEST

Procedure:

1. Connect pressure gauge to bulkhead fitting at back of SYSTEM 1.
2. Energize compressor (Model 89 and Model 90 units use hand terminal; Model 99 units use service mode).
3. Measure output pressure of compressor. Minimum acceptable pressure is 44 psi.

WARNING: Disconnect all utilities to SYSTEM 1 before servicing. Do not service the SYSTEM 1 unless all utilities have been properly locked out. Always follow OSHA Lockout-Tagout and electrical safety-related work practice standards. (See 29 CFR 1910.147 and .331 through .335.)

WARNING: Repairs and adjustments should be attempted only by authorized persons fully acquainted with this equipment. Use of inexperienced, unqualified persons to work on the equipment or the installation of unauthorized parts could cause personal injury or result in costly damage.

9.9 POWER SUPPLY (Model 99 Units)

Procedure:

1. Turn off power and shut off water supply. Follow lock-out/tag-out procedures.
2. Remove lower shroud.
3. Remove control box cover.
4. Remove four mounting screws.
5. Slide power supply upward, and remove the two connectors.

NOTE: The larger connector will require use of a small flat-blade screwdriver to disengage the snap lock in order to remove it.

6. Remove the insulating pad from old power supply and attach to new power supply.
7. Install new power supply by following the steps outlined above in reverse order.

9.10 CONNECTOR BOARD (Model 99 Units)

Procedure:

1. Turn off power, and shut off water supply. Follow lock-out/tag-out procedures.
2. Remove lower shroud.
3. Remove control box cover.
4. Remove connectors from the board.
5. Remove the thermocouple wires.
6. Remove board.
7. Install new board by following the steps outlined above in reverse order.

NOTE: When installing thermocouple wires, white goes to "-" and red goes to "+".

NOTE: The new connector board is supplied with thermocouple calibration data. This data must be entered via the Service Mode. Select "Calibration," and menu selection "RESTORE." Refer to the Service Mode section (Section 5) for complete procedure.

9.11 CONTROL BOARD (Model 99 Units)

Procedure:

1. Turn off power, and shut off water supply. Follow lock-out/tag-out procedures.
2. Remove connectors from rear of control.
3. Remove the standoffs at each jack using a 3/16" nut driver.
4. Remove the plastic cover.
5. Remove J6 and J7 ribbon connector (from Touch Pad).
6. Remove the four screws holding the sheet metal/board assembly to the plastic panel.
7. Gently pick up the sheet metal/board assembly and slide the ribbon cables free.

CAUTION: Use care when picking up the sheet metal/board assembly, because the display and printer cables are still connected under the board.

8. Tilt the sheet metal/board assembly up and disconnect the display cable first; then disconnect the printer cable.
9. Remove the sheet metal/board assembly from the unit.
10. Remove the board from the sheet metal housing.
11. Prepare the replacement board as follows:
    a. New boards are unprogrammed. Either a new-programmed chip set must be installed, or the chip set from the original board must be installed. New chip sets are marked U5 and U22; however, original board chip sets may not be so marked. U5 must be installed in the U5 socket and U22 must be installed in the U22 socket.

NOTE: The dot on the chip must line up with the arrow in the socket.

Use a PLC chip puller (STERIS P-764326-559) to remove chips. If this tool is not available, a 0.050" Allen wrench or similar device can be used to gently pry up the chip from the socket.

b. Remove resistors R55 and R56 from the new board. These are located next to the J9 connector. DO NOT REMOVE THE R54 RESISTOR. R55 and R56 resistors must be removed in order to clear the housing re-installed later.

c. Check the dip switch settings on the new board and adjust so they match the old board.

12. Install new board onto the sheet metal housing.
13. Slide the sheet metal/board assembly in place, connecting the printer connector first, then the display connector.

NOTE: The display cable is not keyed. If not sure as to the proper positioning of the connector, look at both connectors on the cable. Pin 1 of the connector is indicated by an arrow. The Pin 1 designation on the display board can be seen easily so that the display end of the cable can be matched up easily. On the control board, Pin 1 designation is not seen easily; however, the back side of the pins can be seen. Pin 1 has a square cross-section, and therefore the Pin 1 of the connector must be aligned with the pin with the square cross-section.

14. Complete the installation by following the steps outlined above in reverse order.
15. Perform a burn-in and calibration before placing the unit back into service.

9.12 PROGRAM CHIP CHANGE (Model 99 Units)

Equipment, Fixtures, Special Tools:

1. Wrist strap
2. PLC puller (P-764326-559 or equivalent).

Procedure:

1. Turn OFF power to unit. Follow lock-out/tag-out procedures.
2. Open control panel and remove cables and back cover.
3. Using a PLC puller or equivalent, remove the flash memory chips from U5 and U22 sockets.
4. Install new program chips.

NOTE: Replacement chips are marked "U5" and "U22" and must be installed in the correct socket.

NOTE: The dot on the chip must line up with the arrow in the socket.

5. Re-install back cover and cables.
6. Attach Service Access Key and turn power ON.
7. Select Burn-In from the selections, to burn-in the software from the new program chips.
8. Turn OFF power, remove the Service Access Key, then turn the power ON.
9. Run a diagnostic cycle to check unit operation before returning the unit to service.

9.13 DISPLAY (Model 99 Units)

Procedure:

1. Turn OFF power, and shut OFF water supply. Follow lockout/tagout procedures.
2. Remove the control board.
3. Remove the two screws holding the display bracket to the plastic housing.
4. Gently remove the display.

NOTE: Some adhesive from the touch panel will cause the display to stick. Pull gently so as not to damage the display or the touch panel.

5. Remove the bracket from the display.
6. Complete the installation by following the steps outlined above in reverse order.

9.14 PRINTER (Model 99 Units)

Procedure:

1. Turn OFF power, and shut off water supply. Follow lockout/tagout procedures.
2. Flip up cover exposing printer.
3. Loosen the two screws holding the printer in place and slide the printer out.

NOTE: The connector on the printer cable should slide out with the printer so the connector can be grasped when removing the printer. On earlier units, the printer cable was shorter, preventing access to the connector. On these earlier units, it will be necessary to remove the control board for proper access to the connector for the printer.

4. Complete the installation by following the steps outlined above in reverse order.

9.15 PRESSURE TRANSDUCER (Model 99 Units)

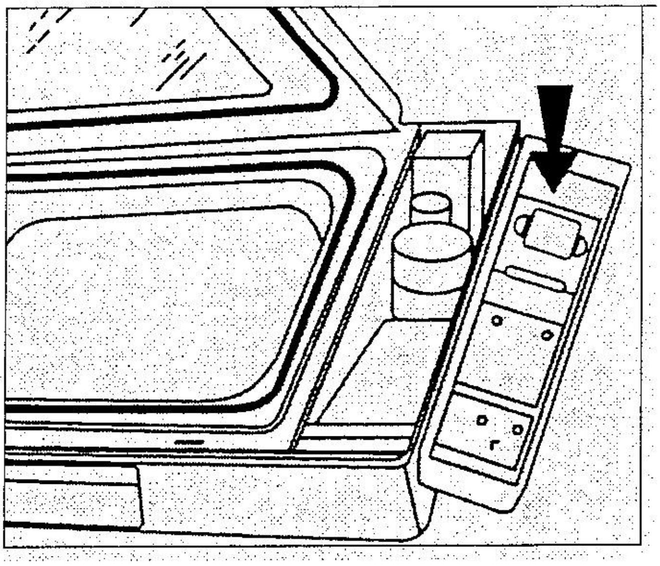
Procedure:

1. Turn OFF power, and shut OFF water supply. Follow lockout/tagout procedures.
2. Disconnect connectors to the transducer, then remove the transducer.
3. Inspect the transducer and note the model number.
4. Install a new transducer and reconnect the wiring.
5. Open the control panel and remove the small plug button to gain access to the control board dip switch. Set the dip switch as follows, depending upon the model number of the transducer being installed:
   - NOSHOK – Position 1 OFF, Position 2 OFF
   - Ametek IPTG – Position 1 ON, Position 2 OFF
   - Ametek MPTG – Position 1 OFF, Position 2 ON

9.16 PAPER ROLL REPLACEMENT PROCEDURE (MODEL 89 AND MODEL 90 UNITS)

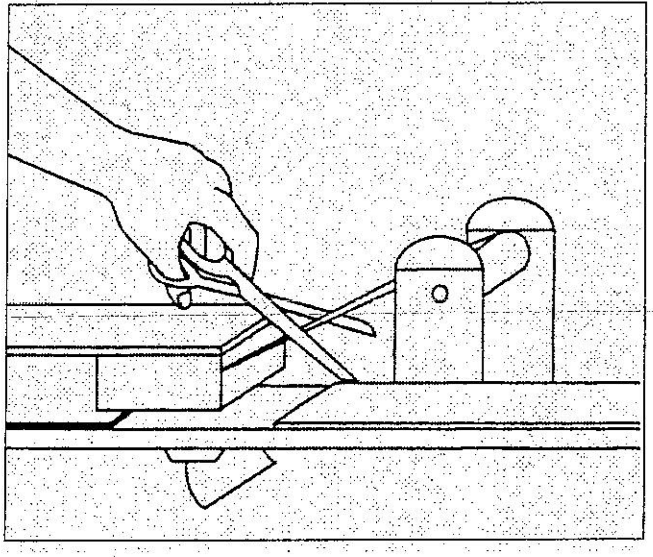
Procedure:

1.Open control panel, then locate printer paper.



2. Cut Paper

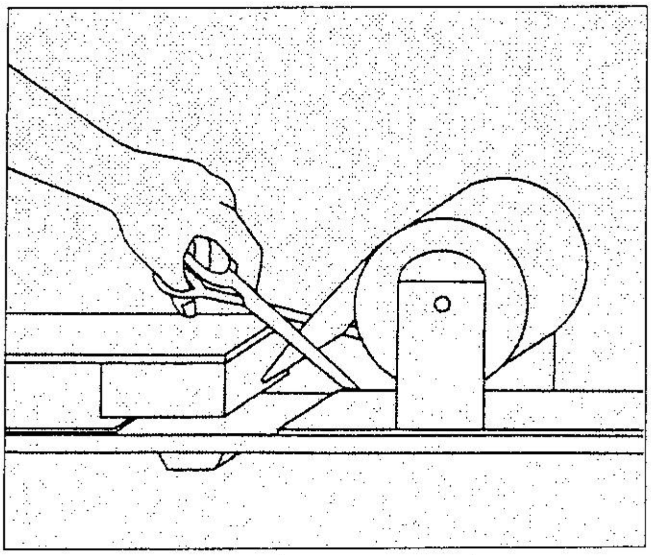
Cut paper at the paper loop. Feed balance of paper through the printer by pressing the "Paper Feed" button on the control panel.



3. Replace Paper

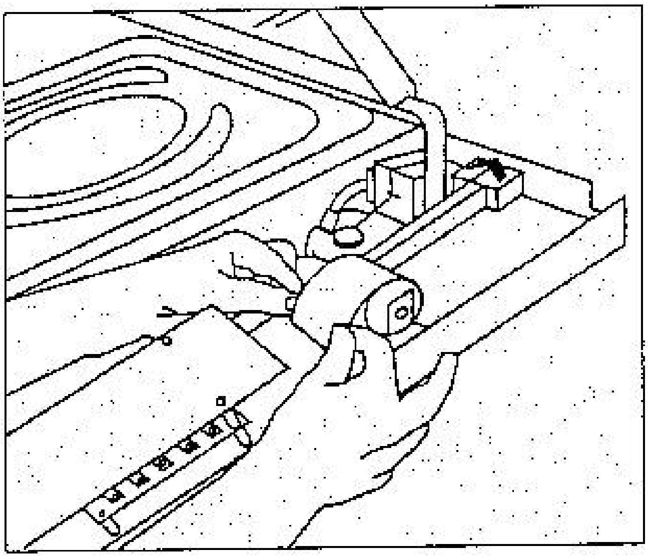
Place new roll of paper on the spindle. Reposition the spindle on the paper holder. Advance paper and cut a straight edge.

- shiny side of paper up
- paper should feed from the top of the roll



4. Feed paper into printer

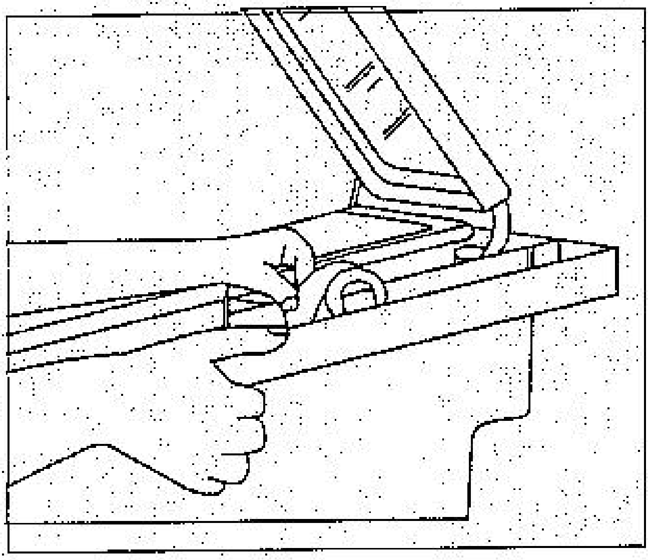
Guide the paper into the printer.



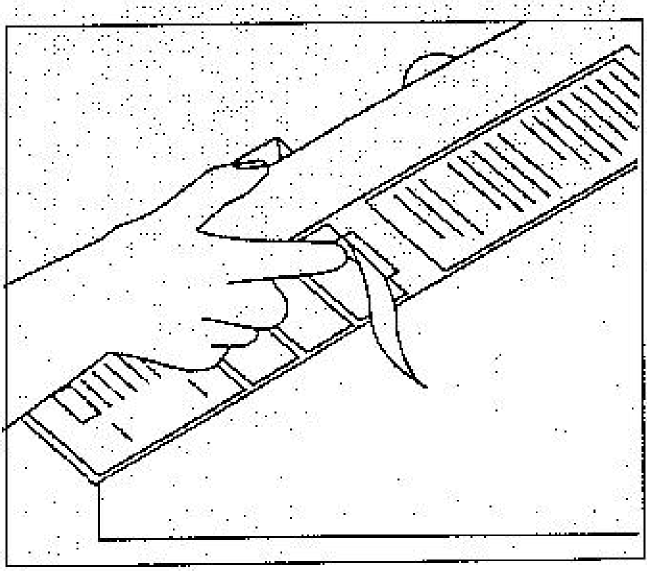
Hold paper with one hand while pressing the "Paper Feed" button on the control panel with the other hand.

Paper advances slowly.

DO NOT FORCE PAPER.



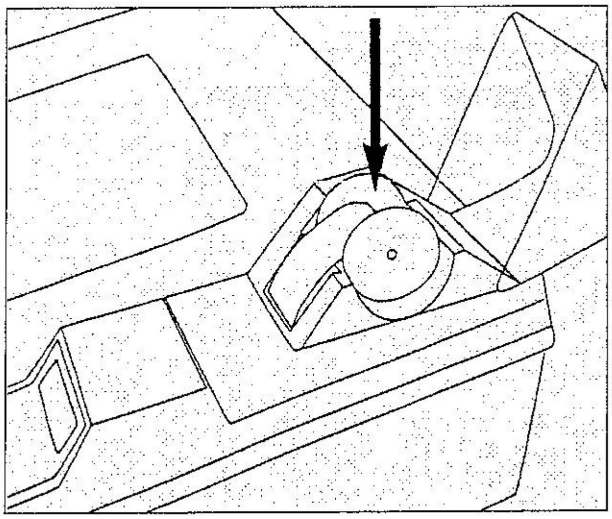
5. Close control panel.



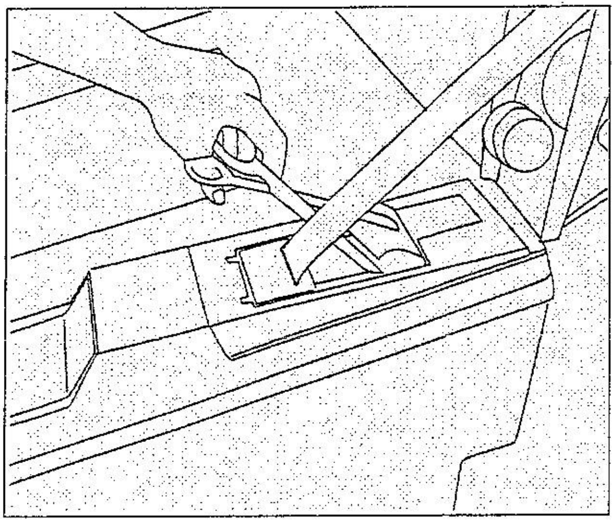
9.17 PAPER ROLL AND INK CARTRIDGE REPLACEMENT PROCEDURE (MODEL 99 UNITS)

Procedure:

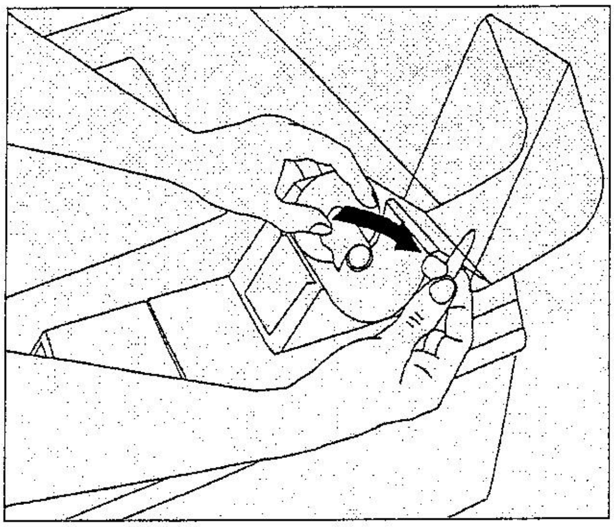
1. Lift up the paper cover to remove what is left of the old paper roll.



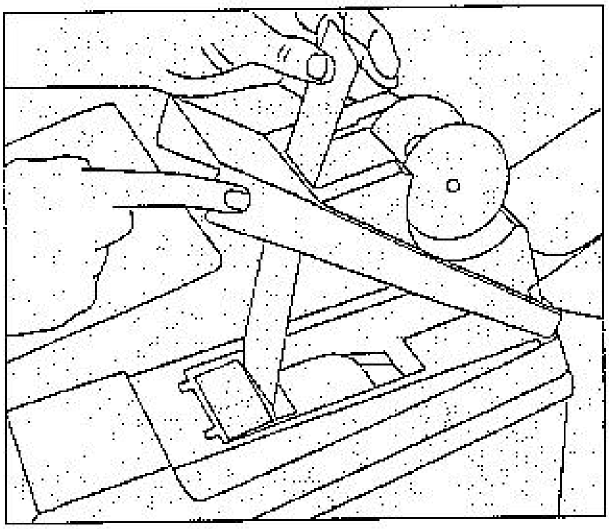
2. Discard the old paper roll, then gently pull out and discard any remaining paper from the ink cartridge area.



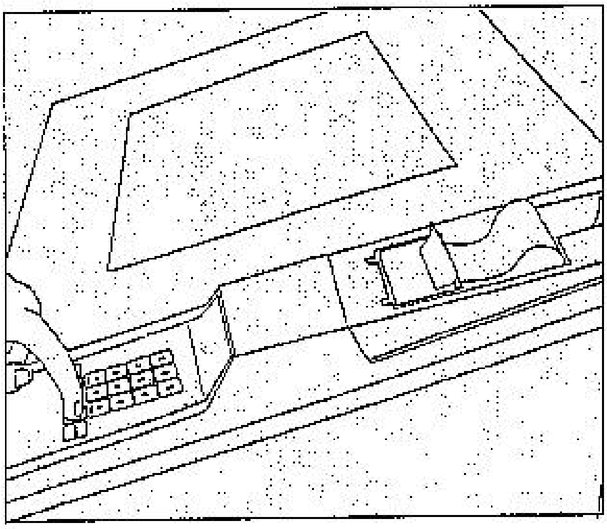
3. Place the new paper roll on the paper spool.



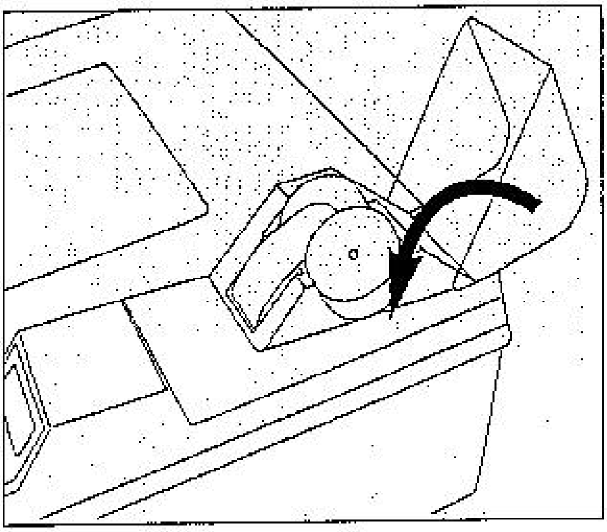
4. Manually feed the end of the paper roll into the printer slot, just behind the ink cartridge. The paper should fit through the space between the ink cartridge body and the ink ribbon.



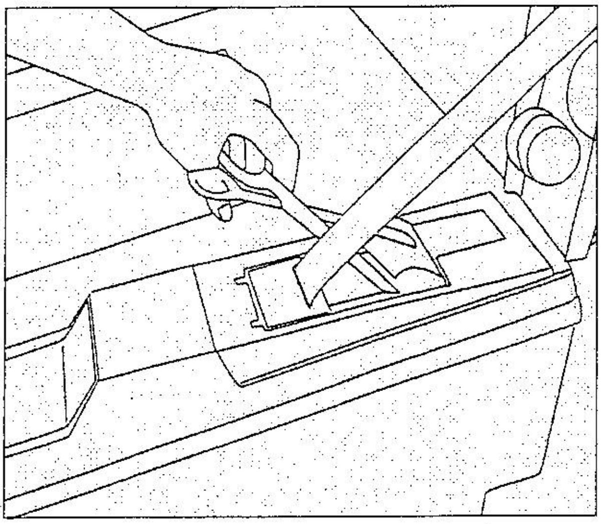
5. Press the "Paper Feed" touch pad until the paper advances through the printer and the ink cartridge, exiting through the front.



6. Close the printer cover, slipping the end of the paper roll through the paper housing cover.

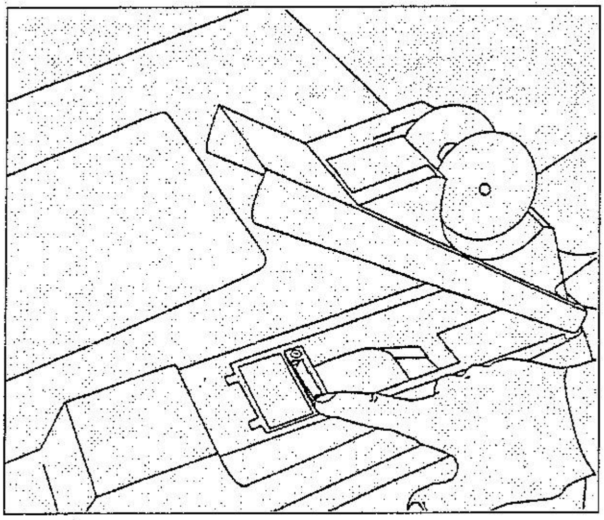


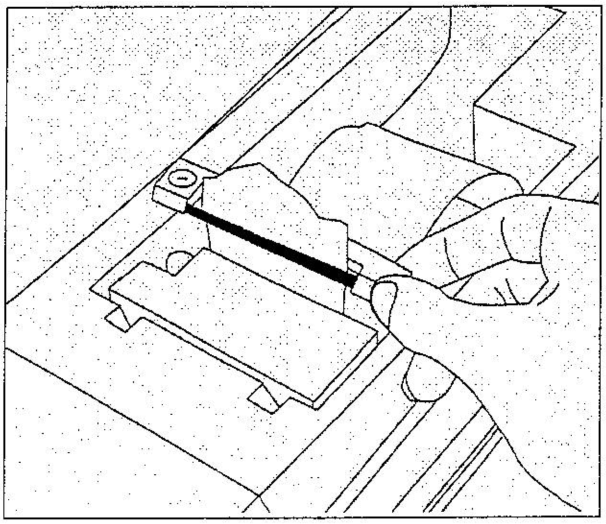
Ink Cartridge replacement proceedure for Model 99 Units



Change the printer ink cartridge (P-150828-440) whenever the type on printouts is light and faded and before printouts become difficult to read. (Frequency of changing will depend upon frequency of use.)

1. With the printer takeup housing cover closed, tear off excess paper at the edge of the cover.
2. Lift up the paper takeup housing cover to access the printer.
3. Press on the right side of the used ink cartridge (the area marked "PUSH") until the cartridge pops out.
4. Slip the used ink cartridge off the end of the paper, then discard it.
5. Slip the new ink cartridge over the paper, in the same position as the one removed, making sure that the paper feeds through the printer and through the space between the the ink cartridge ribbon and the cartridge housing.
6. Press both left and right sides of the cartridge simultaneously until the cartridge snaps into place.
7. Tighten any slack in the ink ribbon by turning the adjustment wheel counterclockwise approximately 1/4 turn.
8. Close the printer takeup housing.

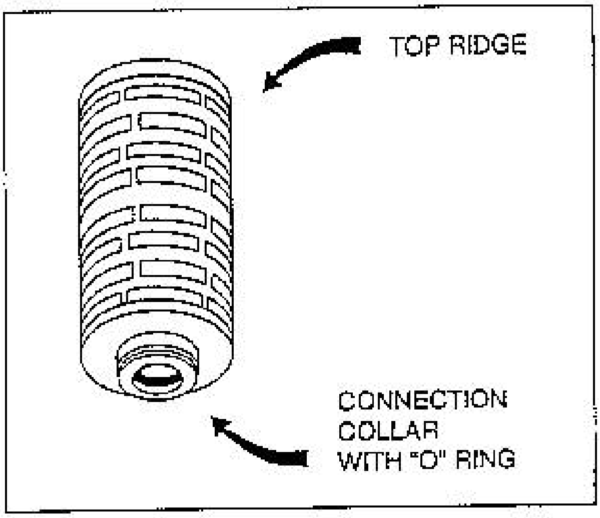




9.18 CHANGING STERILE WATER FILTER

Procedure:

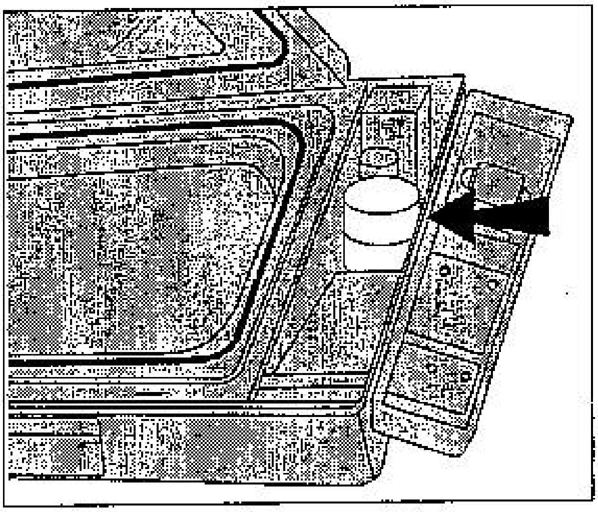
1. Unplug the SYSTEM 1.



2. Locate the sterile water filter housing.

   Open the control panel.
   Locate the sterile water filter housing.

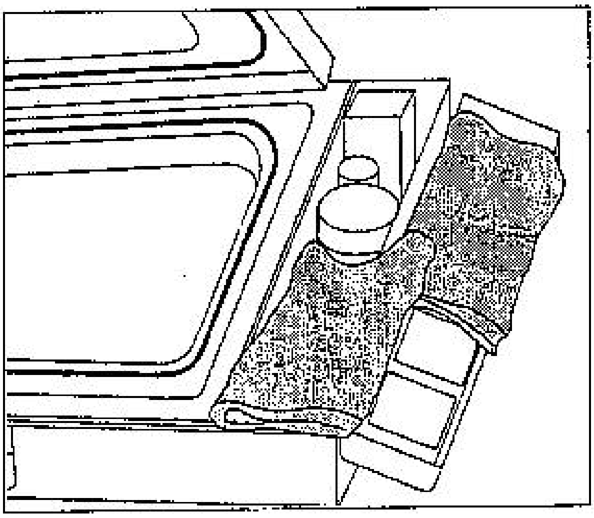
NOTE: Illustrations depict Model 89 and Model 90 nits, procedures are the same for Model 99 units.



3. Protect electronics.

   Place an absorbent towel over the electronic enclosures and printer paper to protect from water drops.

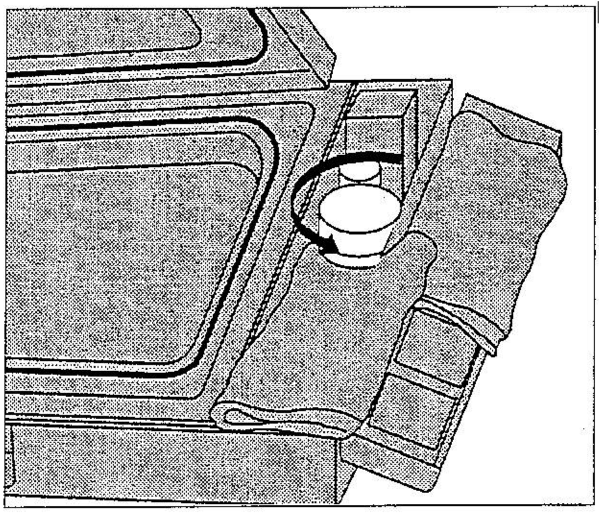
CAUTION: Water spills on the microcomputer housing and/or the printer or printer paper may result in damage to the SYSTEM 1 or create a paper jam.



9.18 CHANGING STERILE WATER FILTER (CONTINUED)

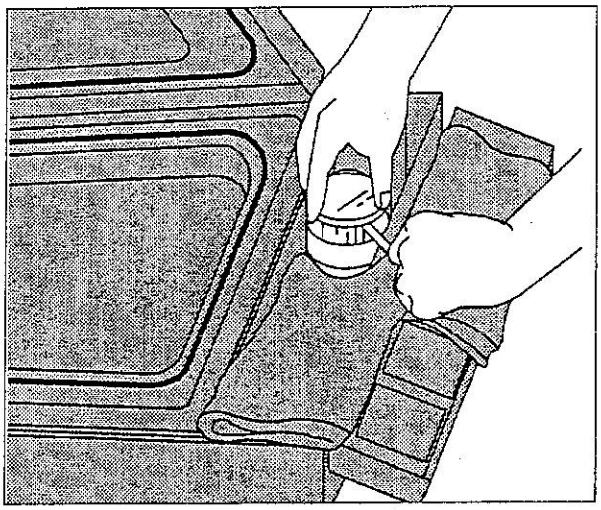
4. Remove filter housing cap.

   Unscrew filter housing cap by turning it counterclockwise.



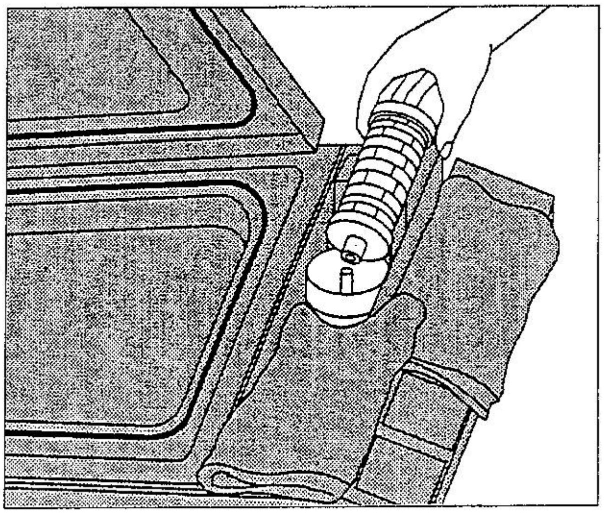
5. Remove filter.

   Place a dull, flat-pointed tool (straight hemostat), under the top of the filter and gently pry up to remove the filter.



6. Drain water from filter.

   While holding the filter over the filter housing, permit water to drain from the filter for 20-30 seconds.



9.18 CHANGING STERILE WATER FILTER (CONTINUED)

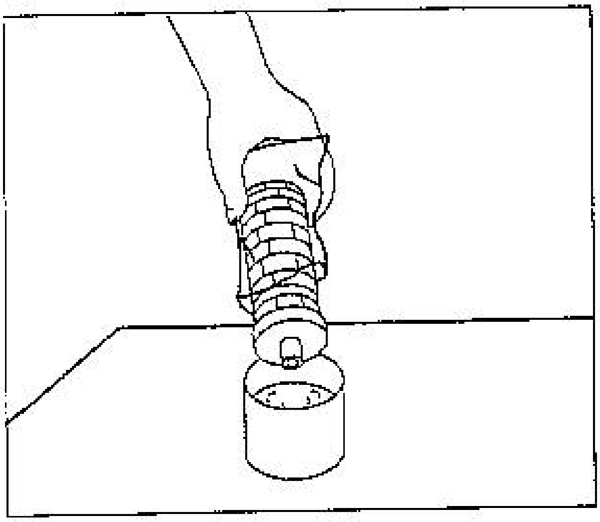
7. Check replacement filter type.

   Examine the replacement filter to ensure it is exactly the same as the one you are replacing (looks alike, same catalog number).

   If it is the same filter, proceed to Step 8.

   If you are converting from one filter type to another, follow instructions supplied with the filter.

   Any questions, Please call STERIS Customer Service at 800-JIT-4-USE (800-548-4873) for assistance.



8. Replace with new water filter.

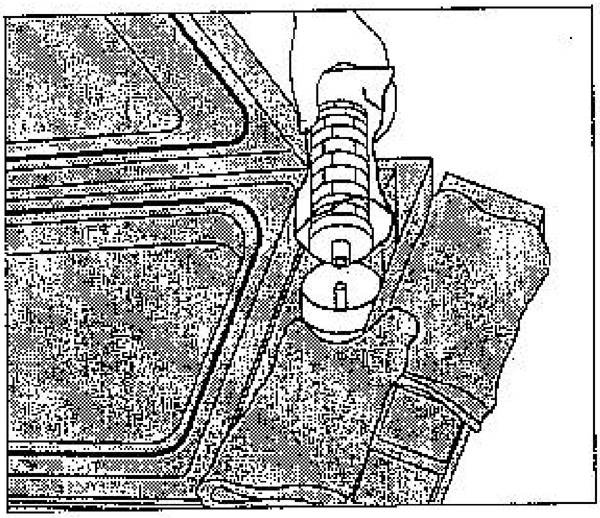
   Cut plastic wrap on seam near filter connection collar with "O" ring.

   CAUTION: Do not remove filter from plastic bag.

   Dip end of filter in water to wet "O" ring.

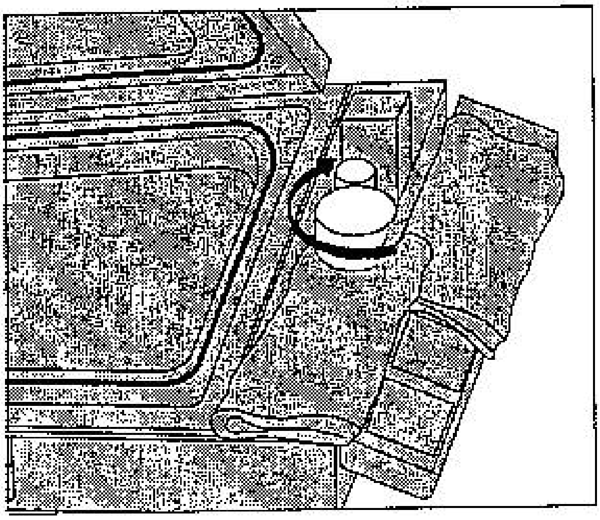
9. Insert filter.

   Align water filter core with the copper tube in the center of the sterile water filter housing. Slide filter out of plastic bag–connecting collar with "O" ring down. Once filter is in the sterile water housing, press on top of filter to ensure it is sealed (top edge of sterile water filter housing). Remove plastic bag.



10. Replace filter housing cap.

    Line up threads– turn clockwise until snug.



11. Remove absorbent towels.

12. Close control panel.

13. Plug in SYSTEM 1.

14. Initiate a diagnostic cycle.

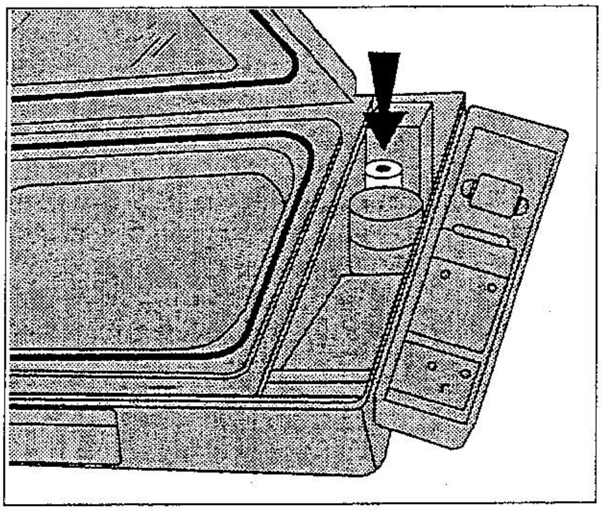
    A successful diagnostic cycle must be completed.

9.19 CHANGING STERILE AIR FILTER

Procedure:

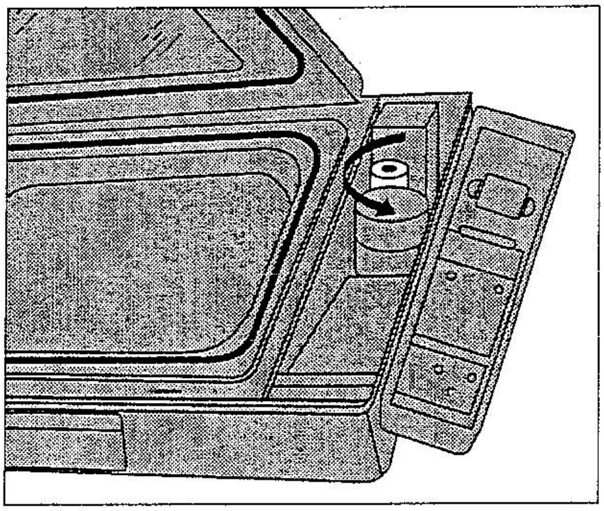
The sterile air filter should be changed every six (6) months.

1. Open the control panel and locate the sterile air filter.



2. Remove the air filter.

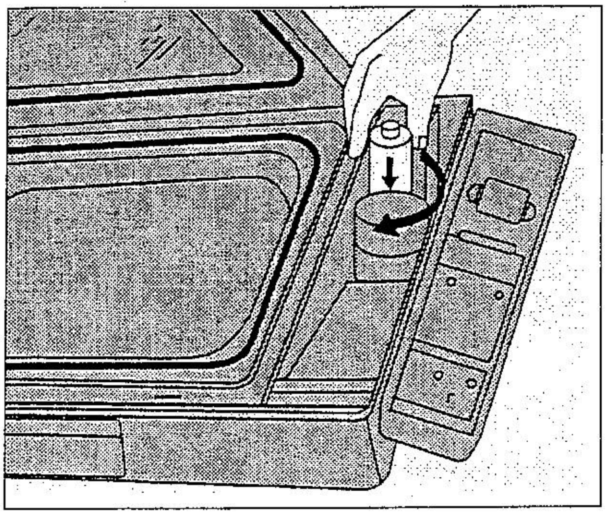
   Turn the air filter counterclockwise and lift up to remove. Discard the used air filter.



3. Replace with new air filter.

   With the flow arrow pointing down, turn the filter clockwise.

4. Close control panel.



9.20 CHANGING PRE-FILTERS

Procedure:

1. Turn OFF water.

   Turn off the water supply to the SYSTEM 1.

2. Exhaust air.

   Press the red button located on the top of the pre-filter to exhaust air.

3. Remove housing.

   Unscrew the housing bowl from the housing body (counterclockwise).

4. Remove filter.

   Remove and discard old filter, rinse housing bowl with clear water.

5. Install new filter.

   a. For 'A' filters or single filter housing assemblies: Place the filter cartridge into the housing bowl with black "O" ring facing up.

   b. For 'B' filters: Install the filter with the black "O" ring up, placing the filter cartridge onto the housing body.

6. Replace filter bowl.

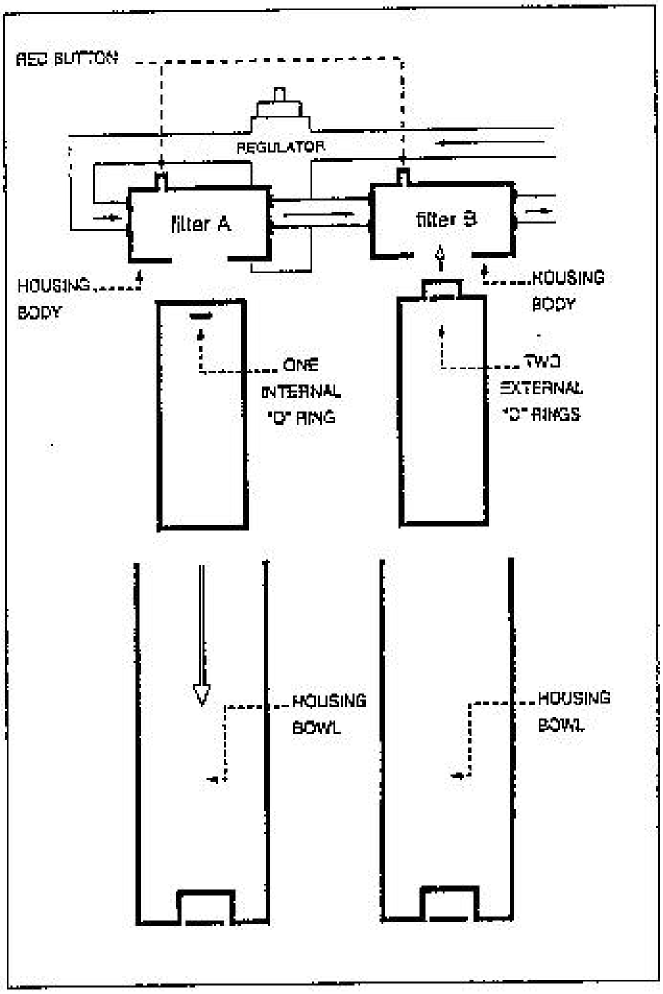
   Screw the filter bowl onto the filter housing (clockwise).

7. Turn on water.

   Restore the water to the filter assembly and SYSTEM 1.

8. Exhaust air.

   Exhaust air from both pre-filters. Press the red button located on top of the pre-filter housing to exhaust air.


RED BUTTON
REGULATOR
filter A
filter B
HOUSING BODY
HOUSING BODY
ONE INTERNAL "O" RING
TWO EXTERNAL "O" RINGS
HOUSING BOWL
HOUSING BOWL

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Section 10: Illustrated Parts Breakdown

Significant assemblies and components of the SYSTEM 1® Sterile Processing System are illustrated and identified in this section. The part number, the description, and the quantity required for each usage are given. Each indentation in the description represents the assembly level. The UNITS PER ASSEMBLY column is specific for the given assembly or subassembly level.

1. Determine the function and application of the part required. Refer to the List of Figures and select the most appropriate title. Note the illustration page number.
2. Turn to the page indicated and locate the desired part on the illustration.
3. From the illustration, obtain the item number assigned to the desired part. Refer to the accompanying description for specific information regarding the part.

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NOTE: Table 10-1 (starting on following page) provides part numbers for the most commonly replaced items on SYSTEM 1 Processors. It is for quick reference only. For a complete listing of parts, refer to the appropriate illustrated parts breakdown in this Maintenance Manual Section 10.

Table 10-1. SYSTEM 1 Parts – Quick Reference Guide

PART #	DESCRIPTION	89A1	90B1	90A1	90A2	99A1	99A2
200175	Air Compressor Assembly				x		x
200050	Air Compressor Assembly	x	x				
200157	Air Compressor Assembly			x		x	
A1600	Aspirator	x	x	x	x	x	x
200136	Air Manifold Assembly - NLA must order individual parts	x	x				
200160	Air Manifold Assembly			x	x	x	x
P129377725	Bar Code Scanner					x	x
P129377726	Bar Code Scanner Cable					x	x
P129376384	Bar Code Scanner Kit					x	x
53B04700	Battery Backed RAM Chip	x	x	x	x		
P093915-047	Battery Backed RAM Chip					x	x
400047	Bearing, Flanged Brass (latch assembly)	x	x	x	x	x	x
200117	Bulkhead Connector Assembly	x	x				
200173	Bulkhead Connector Assembly			x	x	x	x
400208	Bumper, processor feet (452007 Screw, 450211 Washer)	x	x	x	x	x	x
100209	Bushing, Drain orange silicon in General Proc. Tray C1200	x	x	x	x	x	x
27B04300	Bushing, Drain orange silicon in Directed Flow Tray C1220	x	x	x	x	x	x
400069	Caps, shipping inlet and drain (ea.)	x	x	x	x	x	x
400144	Caps shipping quick disconnect (Q.D.) post (small) (ea.)	x	x	x	x	x	x
400145	Caps shipping Q.D. post (large) (ea.)	x	x	x	x	x	x
400345	CK1 Air Inlet Check Valve	x	x	x	x	x	x
400510	CK2, 3 Float Block Drain Check Valve	x	x	x	x	x	x
400368	CK4 Backflow Preventer Check Valve (Kepner Valve'	x	x	x	x	x	x
200226	Kepner Kit (Kepner, 2 O-rings, plastic elbow, plastic nut)	x	x	x	x	x	x
400390	CK5 ,6, 7 Check Valve, Air Manifold and Air-Water Manifold	x	x	x	x	x	x
400696	CK8 Drain Check Valve, retrofit kit	x	x	x	x	x	x
200696	CK8 Rebuild Kit (2 O-rings and spring), Drain Check Valve	x	x	x	x	x	x
400219	CK10 Check Valve, Anti-siphon	x	x	x	x	x	x
200740	Circulation Pump Assembly magnetic drive	x	x		x		x
200739	Circulation Pump Assembly magnetic drive			x		x	
500012	Circuit Breaker	x	x				
500078	Circuit Breaker - 0.5A CB2				x		x
500075	Circuit Breaker - 0.25A CB2			x		x	
500081	Circuit Breaker - 20A CB1				x		x
500067	Circuit Breaker - 10A CB1			x		x	
500119	Connector Block CN3 12 pin	x	x	x	x		
200656	Cross Block Assembly	x	x	x	x	x	x
200311	Drain Tube Assembly	x	x	x	x	x	x
200070FS	Assembly, Drip Pan (452004 screw)	x	x	x	x	x	x
100614	Drain, Transition Block	x	x	x	x	x	x
200655	Drain Block Assembly	x	x	x	x	x	x
100348	Drogue, large	x	x	x	x	x	x
100504	Drogue, small	x	x	x	x	x	x
200148	Drogue, large (including O-ring and glyde ring)	x	x	x	x	x	x
200149	Drogue, small (including O-ring and glyde ring)	x	x	x	x	x	x
500159	EPROM - U.S.	x	x		x		
500167	EPROM - German			x			

Table 10-1. SYSTEM 1 Parts – Quick Reference Guide

PART #	DESCRIPTION	89A1	90B1	90A1	90A2	99A1	99A2
500161	EPROM - U.K.			x			
500168	EPROM - Spanish			x			
500168	EPROM - Mexican				x		
500165	EPROM - Italian			x			
500169	EPROM - French			x			
500169	ERPOM - French Canadian				x		
500160	EPROM - Australia			x			
P755716-763	Chip Set (English, Spanish, French and Italian)					x	x
P755716-912	Chip Set (English and German)					x	x
200142	Fan Assembly	x	x		x		
200065	Fan Assembly			x			
200387	Fluid Port Adapter (C1315 from customer service)	x	x	x	x	x	x
200388	Fluid Port Adapter (double port connections)	x	x	x	x	x	x
400059	Foam Tape	x	x	x	x	x	x
400245	Foam Plugs (tubing padding)	x	x	x	x	x	x
100596	Gasket, drain block to heater assembly	x	x	x	x	x	x
100359	Gasket, HP transition block to circ pinch sleeve assembly	x	x	x	x	x	x
200056	Gas Spring Cylinder	x	x	x	x	x	x
500025	GFCI Hospital Grade Plug, 20A (TECH ONLY)	x	x	x	x	x	x
400477	GFCI Hospital Grade Outlet 20A - 120V screws and cover	x	x	x	x	x	x
400033	Grease, high vacuum (for pinch sleeves)	x	x	x	x	x	x
450400	Grommets (for circulation pump and compressor)	x	x	x	x	x	x
	******* Harnesses & Cables ******						
P146665-364	AC Output Harness (P8 to P3)					x	x
P146665-365	DC Power Harness (P2 to P10 & P11)					x	x
P146665-363	DC Input Cable (P4 to P12)					x	x
P146665-362	Analog Cable (P5A to P5B)					x	x
P136817-135	Transducer Wire Harness (P6 to pressure transducer)					x	x
P136817-129	Serial Port Harness (P3 to Panel)					x	x
P093922-498	Display Harness (P1 to Display)					x	x
P093922-499	Printer Harness Assembly (P2 to Printer)					x	x
P136817-130	DC Power Supply Harness (power supply to J1)					x	x
300014	Ribbon Cable (CN8 to CN1)	x	x	x	x		
100681	Heater Element Gasket	x	x	x	x	x	x
200137	Heater Housing Assembly, stainless steel	x	x	x	x	x	x
452202	Heater Housing Bolts	x	x	x	x	x	x
500106	Heater Element	x	x		x		x
500107	Heater Element			x		x	
200161	HP Transition Block w/concentration probes (100359 gasket)	x	x	x	x	x	x
200697	HP Pump Poppets	x	x	x	x	x	x
200176	High Pressure Pump	x	x		x		x
200156	High Pressure Pump			x		x	
613006	HP Pump Tubing 3/16" under trays	x	x	x	x	x	x
P764329-736	Shim Kit for lid hinge	x	x	x	x	x	x
100356	Hinge Shim	x	x	x	x	x	x
100601	Butt Hinge (lid) 450100 roll pin	x	x	x	x	x	x
100345	Hold Down Blocks	x	x	x	x	x	x
200020	Hose Kit Assembly (3 Hoses and connections)	x	x	x	x	x	x
613004	Hose 5/8" blue (drain and inlet)	x	x	x	x	x	x
400002	Hose Adapter 90 degree brass elbow	x	x	x	x	x	x

Table 10-1. SYSTEM 1 Parts – Quick Reference Guide

PART #	DESCRIPTION	89A1	90B1	90A1	90A2	99A1	99A2
400241	Hose Nipple (brass Connector SOL5, 7 to hose Connector)	x	x	x	x	x	x
400427	Hose Barb 45 degree from CK10 to hose from drip pan	x	x	x	x	x	x
400072	Hose Coupling Female (inlet water hose)	x	x	x	x	x	x
P755716-468	Install Kit (2 pressure gauges, ball valves and hardware)	x	x	x	x	x	x
200293	Installation Kit Assembly (200020, A1503, A1700 and A1525)	x	x	x	x	x	x
450510	Hose Clamp (black hose to brass tube float block)	x	x	x	x	x	x
101012	Labels, service	x	x	x	x	x	x
200095	Latch Shaft Flag Assembly	x	x	x	x	x	x
450100	Latch Shaft Flag Roll Pins	x	x	x	x	x	x
400047	Latch Shaft Flag Bronze Bushing	x	x	x	x	x	x
500019	LS1, Thermal Cutoff Switch	x	x	x	x	x	x
300136	LS2 Seal Pressure Safety Switch Assembly, 30 PSI			x	x	x	x
300052	LS2 Seal Pressure Safety Switch Assembly, 30 PSI	x	x				
200042	LS3 Float Block Switch	x	x	x	x	x	x
500173	LS4 Lid Switch (replaces 500009 & 300113)	x	x	x	x	x	x
300137	LS5 Compressor Control Switch, 40 PSI	x	x	x	x	x	x
500121	LS6 HP Pump Monitor Pressure Switch -	x	x	x	x	x	x
200715	LS6 HP Relocation Kit						
200228FS	Assembly, Lid	x	x	x	x	x	x
500088	Line Filter				x		x
500079	Line Filter			x		x	
400034	Loctite Thread Adhesive	x	x	x	x	x	x
100375	Logo STERIS Prefilter Cover	x	x	x	x	x	x
100134	Logo STERIS front of lid (large label)	x	x	x	x	x	x
400426	Male Tee Branch (nylon)	x	x	x	x	x	x
400141	Male Connector	x	x	x	x	x	x
	(for 613009, 3/16" tubing 1/4" NPT, HP transition block)						
400143	Male Connector	x	x	x	x	x	x
	(for 613009, 3/16" tubing straight conn. 3/8" pinch sleeves)						
400375	Male Connector (for 5/16" tubing 613027straight connector)	x	x	x	x	x	x
400376	Male connector 90 deg elbow w/ comp. fitting on HP pump	x	x	x	x	x	x
200278	Membrane Panel	x					
200282	Membrane Panel		x		x		
100509	Membrane Panel - German			x			
100511	Membrane Panel - Spanish			x	x		
100510	Membrane Panel - French			x	x		
100660	Membrane Panel - Italian			x			
P146665-225	Membrane Panel						x
p146665-367	Membrane Panel (International)					x	x
400080	Metal Water Filter (between SOL8 and sterile water filter)	x	x	x	x	x	x
400035	O-ring Lube	x	x	x	x	x	x
450600	O-ring (large Q.D. post under drip pan)	x	x	x	x	x	x
450601	O-ring (large O-ring in drogue)	x	x	x	x	x	x
450605	O-ring (large Q.D. post in drip pan)	x	x	x	x	x	x
450606	O-ring (air manifold check valve)	x	x	x	x	x	x
450608	O-ring (Kepner check valve outer)	x	x	x	x	x	x
450609	O-ring (small Q.D. post in drip pan)	x	x	x	x	x	x
450610	O-ring (HP small drogue inside)	x	x	x	x	x	x

Table 10-1. SYSTEM 1 Parts – Quick Reference Guide

PART #	DESCRIPTION	89A1	90B1	90A1	90A2	99A1	99A2
450611	O-ring (air/water valve)	x	x	x	x	x	x
450612	O-ring (small Q.D. post under drip pan)	x	x	x	x	x	x
450614	O-ring (Kepner check valve, CK4, inner)	x	x	x	x	x	x
450616	O-ring (between large drogue and cup cutter assembly)	x	x	x	x	x	x
450617	O-ring (small in air manifold)	x	x	x	x	x	x
450620	O-ring (sterile filter housing cap for 200119 new)	x	x	x	x	x	x
450621	O-ring CK1, 2 and 3	x	x	x	x	x	x
450622	O-ring (prefilter housing)	x	x	x	x	x	x
200687	PM Pack which consists of:	x	x	x	x	x	x
	(air filter, CK1, 2, 3, rebuild kit CK8, O-rings for CK1, 2, 3)						
300076	PC Board Interface/Controller	x	x				
300086	PC Board Interface/Controller			x	x		
P146665-002	PC Board Controller					x	x
P093915-200	PC Board Interface					x	x
400420	Pinch Valve Sleeves, silicon	x	x	x	x	x	x
200066	Pinch Valve Assembly	x	x	x	x	x	x
200654	Pinch Valve Branch Assembly	x	x	x	x	x	x
500068	Power supply 5 VDC	x	x	x	x		
P136817-016	Power Supply					x	x
300071	Power Cord Assembly (Int. models, cord not shipped with units)				x		x
100430	Prefilter Assembly Plastic Cover (100375 Logo)	x	x	x	x	x	x
A1501	Prefilter "A" 0.2 micron nominal	x	x	x	x	x	x
A1504	Prefilter "B" 0.2 micron absolute	x	x	x	x	x	x
A1551	Prefilter "A" (A1501) and "B" (A1504) together in one pack	x	x	x	x	x	x
A1550	Prefilter Dual Assembly	x	x	x	x	x	x
400158	Prefilter "B" Housing	x	x	x	x	x	x
400160	Prefilter "A" Housing	x	x	x	x	x	x
400356	Prefilter Plastic Bowls	x	x	x	x	x	x
400507	Prefilter Wrench	x	x	x	x	x	x
400357	Prefilter Relief Button (pressure)	x	x	x	x	x	x
200141	Pressure Transducer Assembly	x	x				
200164	Pressure Transducer Assembly			x	x		
P136817-134	Pressure Transducer Assembly					x	x
400081	Pressure Regulator on the Prefilter Assembly	x	x	x	x	x	x
A1730	Printer Take-up Reel (manual)	x	x	x	x		
P093922-479	Printer Spool Assembly					x	x
P093922-481	Printer Spool Stud					x	x
P129367-593	Printer Take-up Spool Tape (Teflon disc)					x	x
P093922-486	Printer Take-up Motor					x	x
400266	Printer Bezel Thumbscrews	x	x	x	x		
100514	Printer Bezel	x	x	x	x		
101153	Printer Spindle	x	x	x	x		
A1700	Printer Paper (box of 5 rolls)	x	x	x	x		
P129362-819	Printer Paper (box of 3 rolls)					x	x
P150826-440	Printer Ribbon (box of 2)					x	x
101015	Printer Paper Cover	x	x	x	x		
101016	Printer Board Cover	x	x	x	x		
300106	Printer/Display Board Assembly	x	x	x	x		
P093914-003	Printer Header Assembly					x	x
400134	Pronto Adhesive	x	x	x	x	x	x

Table 10-1. SYSTEM 1 Parts – Quick Reference Guide

PART #	DESCRIPTION	89A1	90B1	90A1	90A2	99A1	99A2
200180	Q.D. Air Line (from bulkhead to seal)			x	x	x	x
100038	Q.D. Post, large	x	x	x	x	x	x
100503	Q.D. Post, small	x	x	x	x	x	x
400451	Q.D. Post Tool, large	x	x	x	x	x	x
400452	Q.D. Post Tool, small	x	x	x	x	x	x
300014	Ribbon Cable (from controller to printer, 400610 sleeve)	x	x	x	x		
450100	Roll Pin (all hinges)	x	x	x	x	x	x
100168	Screen, Tray	x	x	x	x	x	x
200213	Seal, Inflatable			x	x	x	x
200253	Seal, Inflatable	x	x				
100135	Seal retainer short, Inflatable seal (452004 screws)	x	x	x	x	x	x
100136	Seal retainer long, Inflatable seal (452004 screws)	x	x	x	x	x	x
100192	Shroud (2 screws back of unit 452112)	x	x	x	x	x	x
500023	SOL1 Compressor Release Solenoid	x	x				
200188	SOL1 Compressor Release Solenoid			x	x	x	x
500016	SOL2, 3, 4 Solenoid Valves	x	x				
200189	SOL2, 3, 4 Solenoid Valves			x	x	x	x
200051	SOL5, 7 Dual Water Inlet Valve Assembly	x	x				
200154	SOL5, 7 Dual Water Inlet Valve Assembly			x	x	x	x
200533	SOL8 Air/Water Solenoid Valve Assembly	x	x				
200534	SOL8 Air/Water Solenoid Valve Assembly			x	x	x	x
500013	SSR1, 2 Solid State Relay	x	x				
200052	SSR1, 2 Solid State Relay Assembly	x	x				
500040	SSR3, 4 Solid State Relay	x	x				
500059	SSR1, 2, 3, 4 Solid State Relay			x	x	x	x
500040	SSR5 Solid State Relay			x	x	x	x
452800	Spring, Latch Bar Assembly	x	x	x	x	x	x
452802	Spring, Metal Filter	x	x	x	x	x	x
452803	Spring, high force, Latch Flag	x	x	x	x	x	x
A1503	Sterile Air Filter	x	x	x	x	x	x
200118	Sterile Filter Housing Cap Assembly	x	x	x	x	x	x
200792	Sterile Filter Housing Assembly					x	x
200119	Sterile Filter Housing Assembly			x	x		
200168	Sterile Filter Housing Assembly	x	x				
A1525	Sterile Water Filter (Maxlife Filter)	x	x	x	x	x	x
612235	Sterile Water Filter A1525 Label	x	x	x	x	x	x
400036	Teflon Thread Sealant	x	x	x	x	x	x
400367	Teflon Tape 1/4" wide	x	x	x	x	x	x
400150	Teflon Tape 3/8" wide	x	x	x	x	x	x
100520	Thermocouple	x	x	x	x	x	x
A1005	Temperature Gauge	x	x	x	x	x	x
400001	Tie Wrap	x	x	x	x	x	x
400037	Tie Wrap Adhesive Mount	x	x	x	x	x	x
500066	Transformer (isolation)			x	x	x	x
100459	Tubing Connector (plastic Connector in drip pan from CK10)	x	x	x	x	x	x
613000	Tubing 3/8" ID green for tray, also in unit	x	x	x	x	x	x
613001	Tubing 1/2" ID green hose in unit	x	x	x	x	x	x
613006	Tubing under tray 3/16" ID clear	x	x	x	x	x	x
613007	Tubing 1/4" ID (CK10 to tubing Connector in drip pan, 100459)	x	x	x	x	x	x

Table 10-1. SYSTEM 1 Parts – Quick Reference Guide

PART #	DESCRIPTION	89A1	90B1	90A1	90A2	99A1	99A2
613009	Tubing 3/16" ID for HP Pump (LS6 to gray HP block)	x	x	x	x	x	x
613027	Tubing polyethylene from HP pump to copper tee	x	x	x	x	x	x
400140	Union Elbow w/Swage Lock in drain block (400139 Adapter)	x	x	x	x	x	x
400071	Washer, Blue Hose	x	x	x	x	x	x
400022	Water Tight Seal (power line incoming to unit)	x	x	x	x	x	x
	***** Service Items *****						
200314	Ball Valve Assembly	x	x	x	x	x	x
300080	Communication Link (RS232 Pigtail)			x	x		
500103	Modular Cable (phone type cable)	x	x	x	x		
500104	Modular Adapter (RS232 port)	x	x	x	x		
100381	Filter Plug	x	x	x	x	x	x
101012	Labels (variables and history)	x	x	x	x	x	x
200273	FS Lid Adjustment Kit (4 spacers & covers for seal retainers)	x	x	x	x	x	x
500105	Plug-in Power Supply (7.5 V 500 MA)	x	x	x	x		
P764328-474	SYSTEM 1 Tool Kit	x	x	x	x	x	x
	***** PROCESSING TRAYS AND CONTAINERS *****						
C1130	Flexible Endoscope Processing Tray	x	x	x	x	x	x
C1140	Flexible Endoscope - Container and Tray	x	x	x	x	x	x
C1141	Flexible Endoscope - Container Only	x	x	x	x	x	x
C1602	Flexible Endoscope - Container Lid Only	x	x	x	x	x	x
C1142	Flexible Endoscope - Tray Only	x	x	x	x	x	x
C1200	General Processing - Container and Tray	x	x	x	x	x	x
C1201	General Processing - Container Only	x	x	x	x	x	x
C1601	General Processing - Container Lid Only	x	x	x	x	x	x
C1202	General Processing - Tray Only	x	x	x	x	x	x
C1220	Directed Flow - Container and Tray	x	x	x	x	x	x
C1221	Directed Flow - Container Only	x	x	x	x	x	x
C1600	Directed Flow - Container Lid Only	x	x	x	x	x	x
C1222	Directed Flow - Tray Only	x	x	x	x	x	x
C1160	Universal Flexible Processing Tray	x	x	x	x	x	x

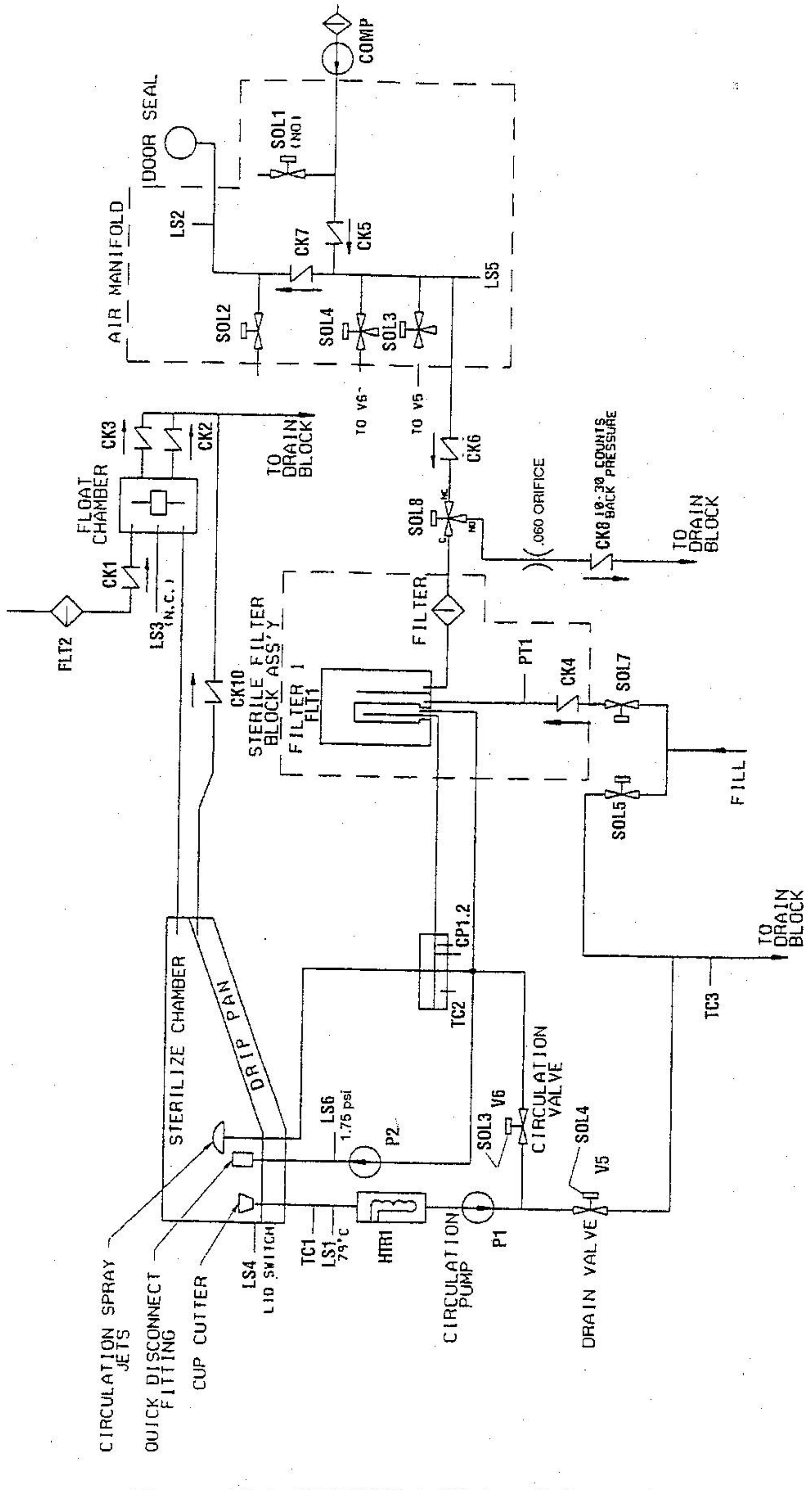
COMP
SOL1 (NO)
DOOR SEAL
AIR MANIFOLD
LS2
CK7
CK5
LS5
SOL2
SOL4
SOL3
TO V6
TO V5
CK6
CK3
FLOAT CHAMBER
CK2
TO DRAIN BLOCK
CK1
LS3 (N.C.)
FLT2
SOL8
NC
NO
C
.060 ORIFICE
CK8 10-30 COUNTS BACK PRESSURE
TO DRAIN BLOCK
FILTER
STERILE FILTER BLOCK ASS'Y
FILTER 1
FLT1
CK10
PT1
CK4
SOL7
FILL
SOL5
TO DRAIN BLOCK
TC3
CP1.2
TC2
STERILIZE CHAMBER
DRIP PAN
LS6
1.75 psi
P2
SOL3
V6
CIRCULATION VALVE
SOL4
V5
DRAIN VALVE
P1
CIRCULATION PUMP
HTR1
TC1
LS1
79°C
LS4
LID SWITCH
CUP CUTTER
QUICK DISCONNECT FITTING
CIRCULATION SPRAY JETS

Figure 10-1. SYSTEM 1 Piping Schematic

PIPING SCHEMATIC

Chart Name	Part No.	Description
CK1	400345	Air Inlet Check Valve
CK2	400510	Float Block Drain Check
CK3	400510	Float Block Drain Check
CK4	400368	Backflow Preventer Check Valve
CK5	400390	Air Manifold Check Valve
CK6	400390	Air-Water Check Valve (in air manifold)
CK7	400390	Air Manifold Check Valve
CK8	400696	Drain Check Valve
CK9	N/A	Pressure Relief Valve (internal to pump 2)
CK10	400219	Anti-siphon Check Valve
COMP	200175	Air Compressor (90A2, 99A2 only)
COMP	200050	Air Compressor (89A, 90B1 only)
COMP	200157	Air Compressor (90A1, 99A1 only)
CP1, CP2	200181	Conductivity Probes
FLT1	200119	Sterile Filter Housing (90A1, 90A2, only)
FLT1	200168	Sterile Filter Housing (89A1, 90B1 only)
FLT1	200792	Sterile Filter Housing (99A1, 99A2 only)
FLT2	A1525	Sterile Air Filter
HTR1	500107	Heater Element (1500 watt) (90A1, 99A1 only)
HTR1	500106	Heater Element (1500 watt) (89A1, 90B1, 90A2, 99A2 only)
LS1	500019	Thermal Cutoff Switch
LS2	300136	Seal Pressure Safety Switch
LS3	200042	Float Block Switch
LS4	500173	Lid Switch
LS5	300137	Compressor Control Switch
LS6	500121	H.P. Pump Monitor (pressure switch)
P1	200740	Circulation Pump (89A1, 90A2, 90B1, 99A2 only)
P1	200739	Circulation Pump (90A1, 99A1 only)
P2	200176	High Pressure Pump (89A1, 90A2, 90B1, 99A2 only)
P2	200156	High Pressure Pump (90A1, 99A1 only)
PT1	200141	Pressure Transducer (89A1, 90B1 only)
PT1	200164	Pressure Transducer (90A1, 90A2 only)
PT1	P-136817-134	Pressure Transducer (99A1, 99A2 only)
SSR1 & 2	500013	Solid State Relay (89A1 & 90B1 only)
SSR3 & 4	500040	Solid State Relay (89A1 & 90B1 only)
SSR1, 2, 3, 4	500059	Solid State Relay (90A1, 90A2, 99A1 & 99A2 only)
SSR5	500040	Solid State Relay (90A1, 90A2, 99A1 & 99A2 only)
SOL1	500023	Compressor Release Valve Solenoid (89A1 & 90B1 only)
SOL1	200188	Compressor Release Valve Solenoid (90A1, 90A2, 99A1, 99A2 only)
SOL2, 3, 4	500016	Seal Release, Circulation & Drain Pinch Valves (89A1 & 90B1 only)
SOL2, 3, 4	200189	Seal Release, Circulation & Drain Pinch Valves (90A1, 90A2, 99A1, 99A2 only)
SOL5, 7	200051	Dual Water Inlet Valve Assembly (89A1 & 90B1 only)
SOL5, 7	200154	Dual Water Inlet Valve Assembly (90A1, 90A2, 99A1, 99A2 only)
SOL8	200533	Air-Water Solenoid Valves (89A1 & 90B1 only)
SOL8	200534	Air-Water Solenoid Valves (90A1, 90A2, 99A1, 99A2 only)
TC1	100520	Thermocouple #1 (drain transition block)
TC2	100520	Thermocouple #2 (high pressure transition block)
TC3	100520	Thermocouple #3 (drain block assembly)
V5	400420	Drain Pinch Valve
V6	400420	Circulation Pinch Valve

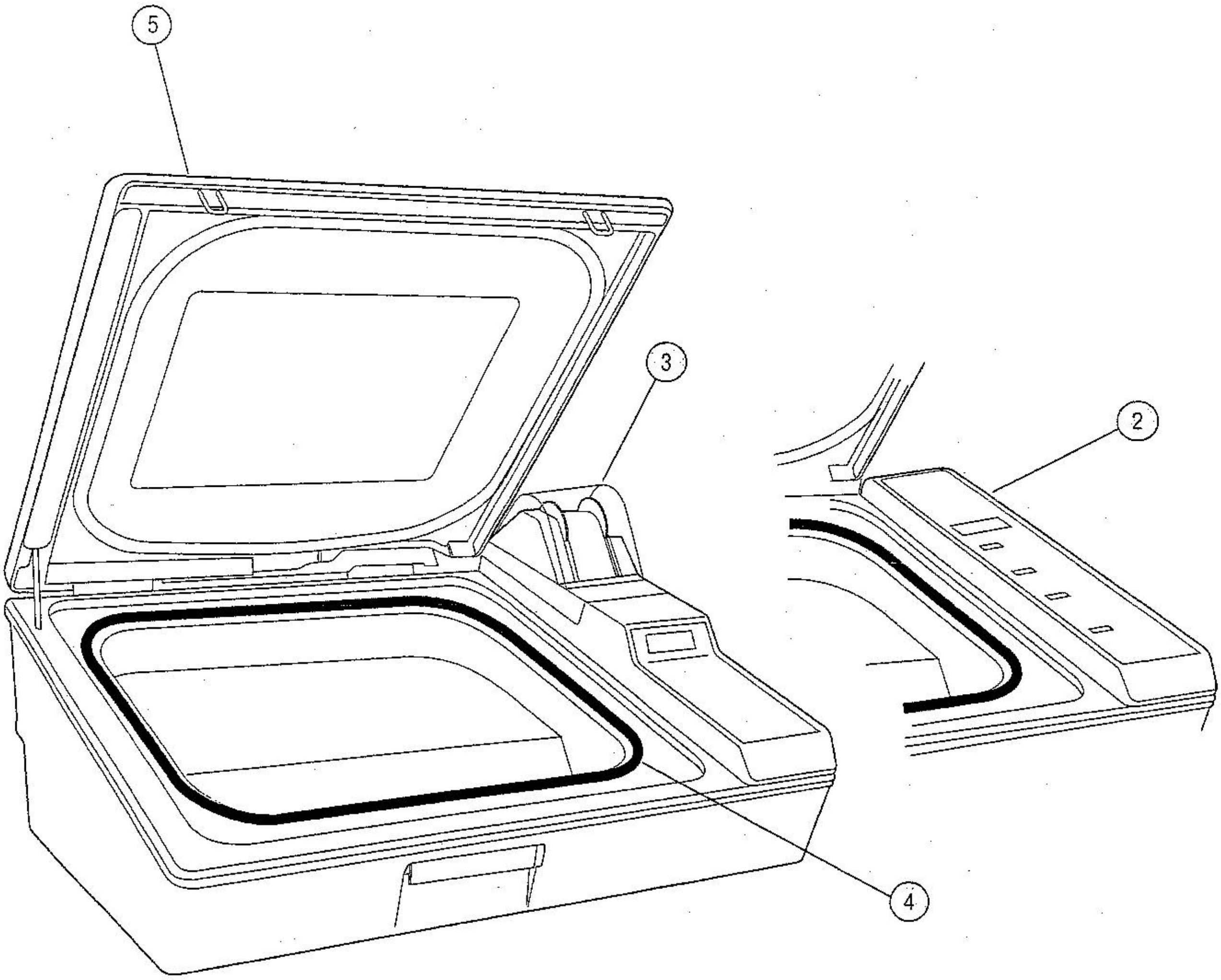

Figure 10-2. SYSTEM 1 Complete

FIG. & ITEM NO.	PART NUMBER			S V C	DESCRIPTION	UNITS PER ASSEMBLY					
						89A1	90B1	90A1	90A2	99A1	99A2
10-2-					SYSTEM 1 – COMPLETE	X	X	X	X	X	X
1		C-1130			TRAY, Flexible Endoscope Processing (Not Shown)	A/R	A/R	A/R	A/R	A/R	A/R
		C-1140			TRAY, Flexible Endoscope Processing Container and Tray (Not Shown)	A/R	A/R	A/R	A/R	A/R	A/R
		C-1142			TRAY, Flexible Endoscope (Tray Only, Not Shown)	A/R	A/R	A/R	A/R	A/R	A/R
		C-1202			TRAY, General Processing (Tray Only, Not Shown)	A/R	A/R	A/R	A/R	A/R	A/R
		100209			• BUSHING, Drain (General Processing Tray) (Not Shown)	1	1	1	1	1	1
		C-1200			TRAY, General Processing Container and (Not Shown)	A/R	A/R	A/R	A/R	A/R	A/R
		100209			• BUSHING, Drain (General Processing Tray, Not Shown)	1	1	1	1	1	1
		C-1220			TRAY, Directed Flow Processing Container (Not Shown) and	A/R	A/R	A/R	A/R	A/R	A/R
		27B04300			• BUSHING, Drain (Directed Flow Tray) (Not Shown)	1	1	1	1	1	1
		C-1222			TRAY, Directed Flow (Tray Only, Not Shown)	A/R	A/R	A/R	A/R	A/R	A/R
		27B04300			• BUSHING, Drain (Directed Flow Tray) (Not Shown)	1	1	1	1	1	1
		C-1141			CONTAINER, Flexible Endoscope (Container Only, Not Shown)	A/R	A/R	A/R	A/R	A/R	A/R
		200387			• ADAPTER, Fluid Port (Not Shown)	1	1	1	1	1	1
		200388			• ADAPTER, Fluid Port (Double Port Connections, Not Shown)	1	1	1	1	1	1
		C-1602			CONTAINER, Flex. Endoscope (Container Lid Only, Not Shown)	A/R	A/R	A/R	A/R	A/R	A/R
		C-1201			CONTAINER, General Processing (Container Only, Not Shown)	A/R	A/R	A/R	A/R	A/R	A/R
		C-1601			CONTAINER, Gen. Processing (Cont. Lid Only, Not Shown)	A/R	A/R	A/R	A/R	A/R	A/R
		C-1221			CONTAINER, Directed Flow (Container Only, Not Shown)	A/R	A/R	A/R	A/R	A/R	A/R
		200387			• ADAPTER, Fluid Port (Not Shown)	1	1	1	1	1	1
		200388			• ADAPTER, Fluid Port (Double Port Connections, Not Shown)	1	1	1	1	1	1
		C-1600			CONTAINER, Directed Flow (Container Lid Only, Not Shown)	A/R	A/R	A/R	A/R	A/R	A/R
		C-1160			TRAY, Universal Flexible Processor (Tray Only, Not Shown)	A/R	A/R	A/R	A/R	A/R	A/R
2					ASSEMBLY, Control (See Fig. 10-13)	1	1	1	1	–	–
3					ASSEMBLY, Control (See Fig. 10-14)	–	–	–	–	1	1
4		200070	FS		ASSEMBLY, Drip Pan, & Components (See Fig. 10-4)	1	1	1	1	1	1
5		200228	FS		ASSEMBLY, Lid, & Components (See Fig. 10-4)	1	1	1	1	1	1
6		A1600			ASPIRATOR (Not Shown)	1	1	1	1	1	1
7		613007			TUBING, 3/16" (Tubing Under Tray) (Not Shown)	A/R	A/R	A/R	A/R	A/R	A/R
8		200806			KIT, Installation, SYSTEM 1 (Not Shown)	–	–	–	–	X	X
		A1503			• FILTER, Sterile Air	–	–	–	–	1	1
		A1525			• FILTER, Sterile Water	–	–	–	–	1	1
	P	091007	091		• HINGE, Washer	–	–	–	–	2	2
	P	129362	819		• PAPER, Printer (3 Rolls)	–	–	–	–	1	1
	P	146665	368		• COVER, Paper Take-Up	–	–	–	–	1	1
	P	150828	440		• PRINTER RIBBON, Epson (2 per Box)	–	–	–	–	1	1
		T6400			• GUIDE, Site Preparation, SYSTEM 1	–	–	–	–	1	1
9		200293			ASSEMBLY, Installation Kit (Not Shown)	X	X	X	X	–	–
		A1503			• FILTER, Sterile Air	1	1	1	1	–	–
		A1525			• FILTER, Sterile Water	1	1	1	1	–	–
		A1700			• PAPER, Printer (3 Rolls)	1	1	1	1	–	–
		612022			• GUIDE, Site Preparation	1	1	1	1	–	–
		200960			• HOSE ASSEMBLY, NSF (See Figure 10-10)	1	1	1	1	–	–

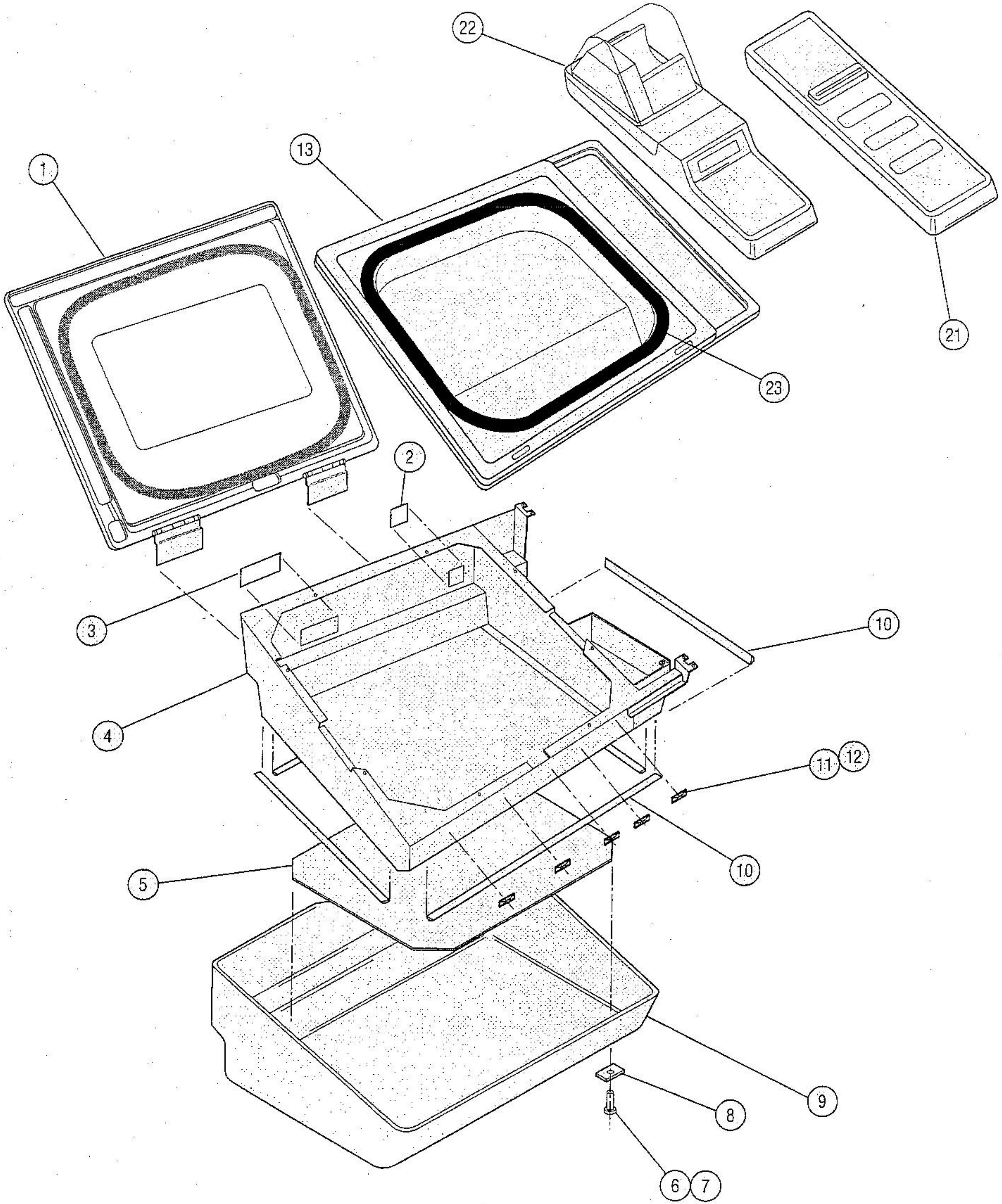
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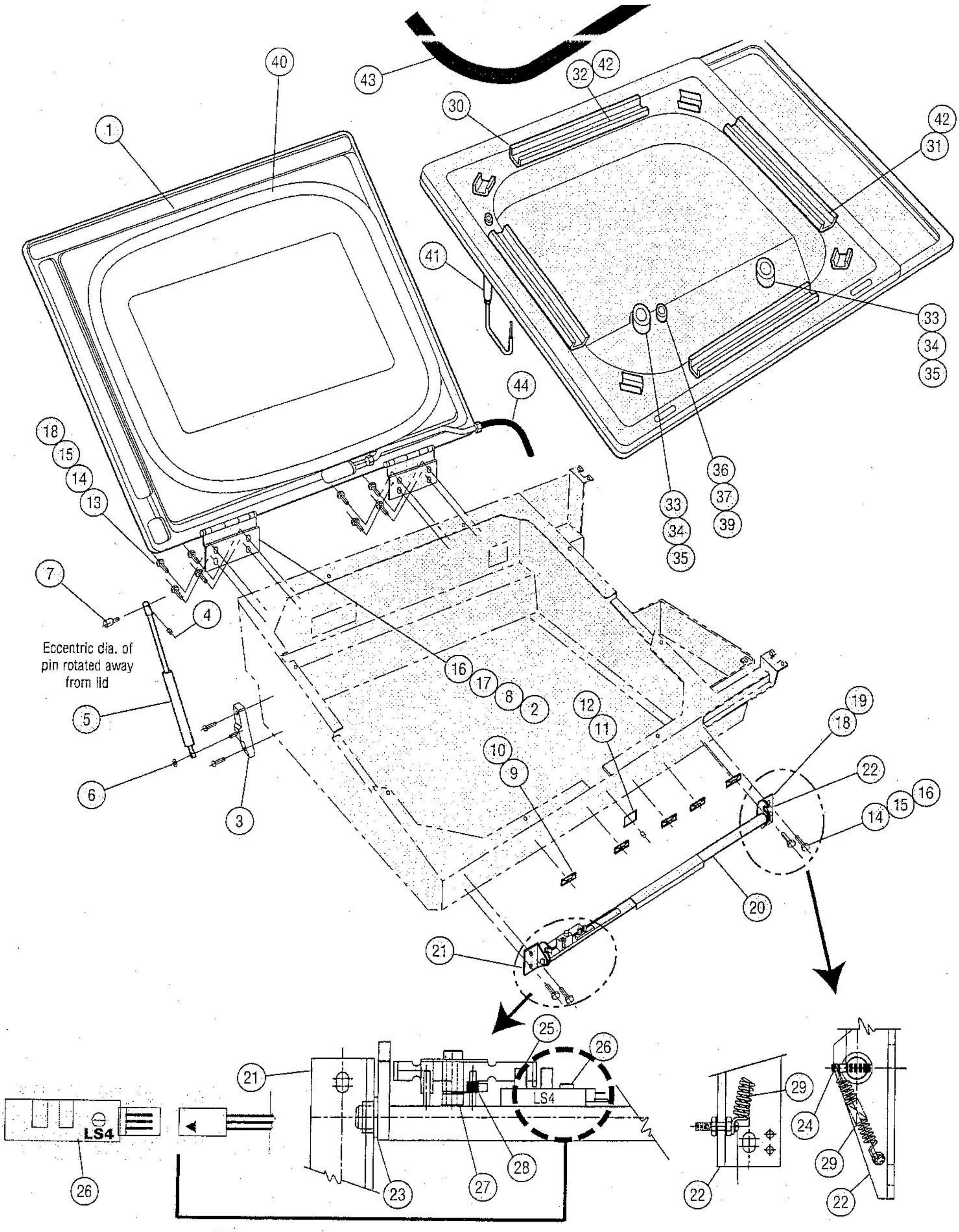
Figure 10-3. Frame Components

FIG. & ITEM NO.		PART NUMBER		SVC	DESCRIPTION	UNITS PER ASSEMBLY					
						89A1	90B1	90A1	90A2	99A1	99A2
10-3-					**FRAME COMPONENTS – PANELS**	X	X	X	X	X	X
1		200228FS			ASSEMBLY, Lid (See Fig. 10-4)	1	1	1	1	1	1
2		100717			PANEL, Access (1-Relay)	1	1	1	1	1	1
3		100718			PANEL, Access (3-Relay)	1	1	1	1	1	1
4					WELDMENT, Frame	1	1	1	1	1	1
5	P	136817	139		SHIELD, Cover	–	–	–	–	1	1
6		400211			WASHER #10	4	4	4	4	4	4
7		452007			SCREW, Button Head, #10-32 x 1"	4	4	4	4	4	4
8		400208			BUMPER, Feet	4	4	4	4	4	4
9		100192			SHROUD, Lower	1	1	1	1	1	1
		452112			• SCREWS, Shroud, 1/4-20 x 5/8" Lg	2	2	2	2	2	2
10		613046			GASKET, EMI	–	–	–	–	A/R	A/R
11		400001			TIE, Cable	A/R	A/R	A/R	A/R	A/R	A/R
12		400037			ADHESIVE, Mount	A/R	A/R	A/R	A/R	A/R	A/R
13		200070FS			ASSEMBLY, Drip Pan (See Fig. 10-4)	1	1	1	1	1	1
14		450402			GROMMET, Flex, 2-9/16 Lg. (Not Shown)	1	1	1	1	1	1
15		450403			GROMMET, Flex, 4-7/8" Lg. (Not Shown)	1	1	1	1	1	1
16		450404			GROMMET, Flex, 2-15/16" Lg. (Not Shown)	1	1	1	1	1	1
17		450405			GROMMET, Flex, 4-7/16" Lg. (Not Shown)	1	1	1	1	1	1
18		450406			GROMMET, Flex, 4-15/16" Lg. (Not Shown)	1	1	1	1	1	1
19		450407			GROMMET, Flex, 6-1/4" Lg. (Not Shown)	1	1	1	1	1	1
20		450408			GROMMET, Flex, 2-1/4" Lg. (Not Shown)	1	1	1	1	1	1
21					ASSEMBLY, Control (See Fig. 10-13)	1	1	1	1	–	–
22					ASSEMBLY, Control (See Fig. 10-14)	–	–	–	–	1	1
23		200213			SEAL, Inflatable	–	–	1	1	1	1
		200253			SEAL, Inflatable	1	1	–	–	–	–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Eccentric dia. of
pin rotated away
from lid
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LS4
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LS4
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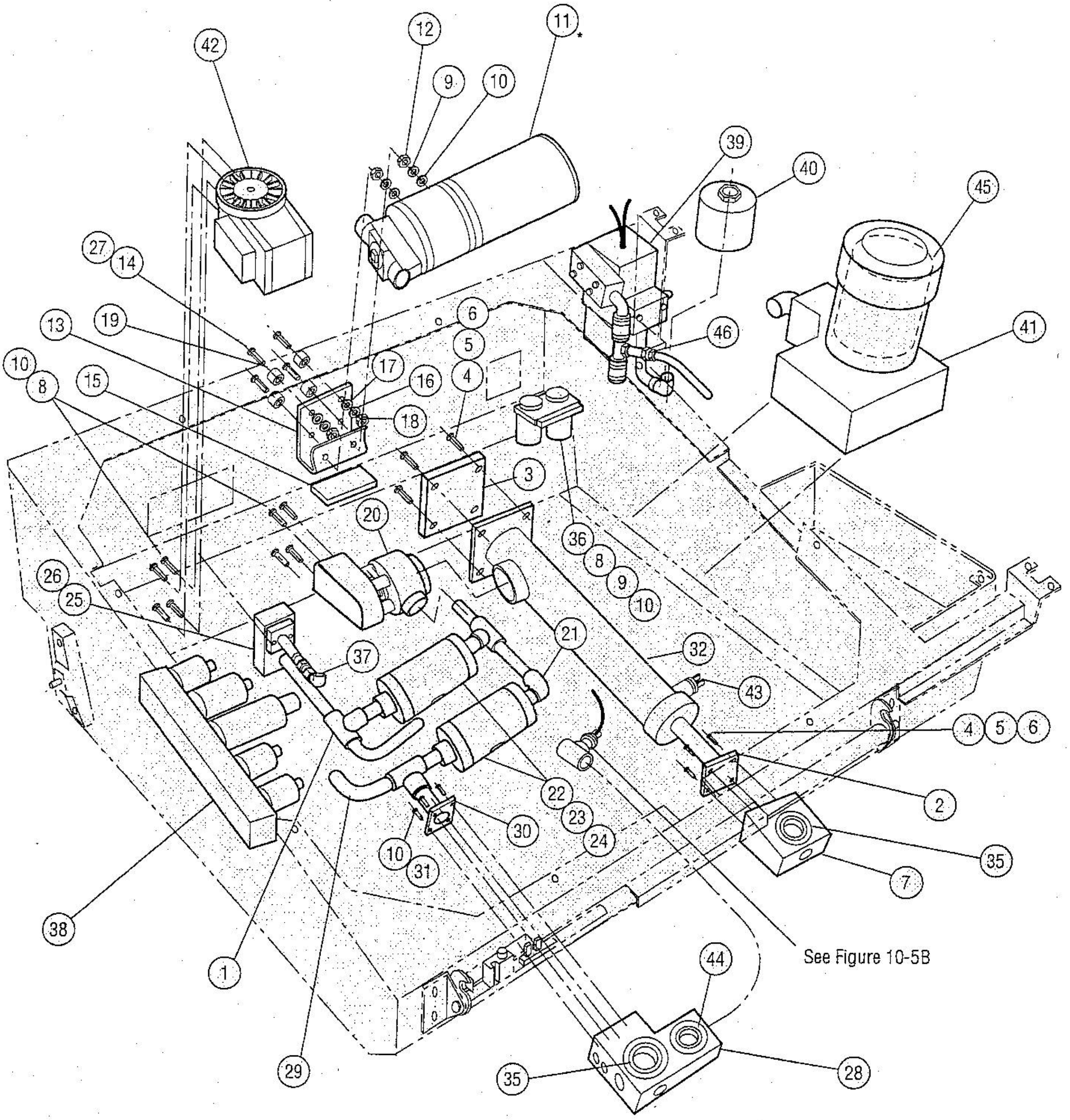
Figure 10-4. Lid Assembly and Related Components

FIG. & ITEM NO.	PART NUMBER			SVC	DESCRIPTION	UNITS PER ASSEMBLY					
						99A1	90B1	90A1	90A2	99A1	99A2
10-4-					LID ASSEMBLY AND RELATED COMPONENTS	X	X	X	X	X	X
1		200228FS			ASSEMBLY, Lid	1	1	1	1	1	1
		200311			• ASSEMBLY, Drain Tube	1	1	1	1	1	1
2		100601			HINGE	2	2	2	2	2	2
3		200055			BRACKET, Gas Cylinder	1	1	1	1	1	1
4		451907			SCREW, Set, #8-32 x 1/2" Lg.	1	1	1	1	1	1
5		200056			Gas Spring Cylinder	1	1	1	1	1	1
6		451000			RING, Retaining	1	1	1	1	1	1
7		100063			PIN, Clevis	1	1	1	1	1	1
8		100356			SHIM, Hinge	2	2	2	2	2	2
9		400001			TIE, Cable	A/R	A/R	A/R	A/R	A/R	A/R
10		400037			ADHESIVE, Tie Wrap Mount	A/R	A/R	A/R	A/R	A/R	A/R
11		451907			SCREW, Set #8-32 x 1/2 Lg.	1	1	1	1	1	1
12		400197			STRIKE, Steel	1	1	1	1	1	1
13		452004			SCREW, Flat Head, #10-32 x 1/2 Lg.	12	12	12	12	12	12
14		450201			WASHER, Lock, #10	8	8	8	8	8	8
15		450211			WASHER, Flat, #10	8	8	8	4	8	8
16		452000		*	SCREW, Socket Cap, #10-32 x 1/2 Lg.	4	4	4	4	4	4
17	P	764329	736		KIT, Lid Shim	A/R	A/R	A/R	A/R	A/R	A/R
18		450100			PIN, Roll	4	4	4	4	4	4
19		100362			SHIM, Latch, 0.030 Thk.	2	2	2	2	2	2
		100633			SHIM, Latch, 0.016 Thk.	2	2	2	2	2	2
		100679			SHIM, Latch, 0.025 Thk.	A/R	A/R	A/R	A/R	A/R	A/R
		100770			SHIM, Latch, 0.008 Thk.	A/R	A/R	A/R	A/R	A/R	A/R
20		200095			ASSEMBLY, Latch Shaft & Flag	1	1	1	1	1	1
21		100234			• BRACKET, Latch, L.H.	1	1	1	1	1	1
22		100233			• BRACKET, Latch, R.H.	1	1	1	1	1	1
23		400047			BEARING, Flanged	2	2	2	2	2	2
24		450002			PIN, Knurled, 1/8" Dia.	1	1	1	1	1	1
25		500173			SWITCH, Lid Limit (LS4)	1	1	1	1	1	1
26		451820			SCREW, Pan Head, #6-32 x .38" Lg.	1	1	1	1	1	1
27		450248			WASHER, Wave, SS	1	1	1	1	1	1
28		452803			SPRING, Torsion	1	1	1	1	1	1
29		452800		*	SPRING, Extension (Latch Bar)	1	1	1	1	1	1
30		200070FS			ASSEMBLY, Drip Pan	1	1	1	1	1	1
31		100135			RETAINER, Short Seal	2	2	2	2	2	2
32		100136			RETAINER, Long Seal	2	2	2	2	2	2
33		450600			O-ring (Drain Block)	2	2	2	2	2	2
34		450605			O-ring (Quick Disconnect Post)	2	2	2	2	2	2
35		100038			POST, Quick Disconnect	2	2	2	2	2	2
36		450609			O-ring (Quick Disconnect Post)	1	1	1	1	1	1
37		450612			O-ring (Transition Block)	1	1	1	1	1	1
38					Item # Not Used						
39		100503			POST, Quick Disconnect, High Pressure	1	1	1	1	1	1
40		200213			SEAL, Chamber	1	1	1	1	1	1
41					DISCONNECT, Quick, Air Line (see Fig. 10-12)	1	1	1	1	1	1
42		452004			SCREW	8	8	8	8	8	8
43		200213			SEAL, Inflatable	–	–	1	1	1	1
		200253			SEAL, Inflatable	1	1	–	–	–	–
44		200311			ASSEMBLY, Drain Tube	1	1	1	1	1	1
45		400451			TOOL, Quick Disconnect Post, Large (Tech. Tool) (Not Shown)	A/R	A/R	A/R	A/R	A/R	A/R
46		400452			TOOL, Quick Disconnect Post, Small (Tech. Tool) (Not Shown)	A/R	A/R	A/R	A/R	A/R	A/R
					* Use Loctite® 242, P/N 400034	A/R	A/R	A/R	A/R	A/R	A/R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See Figure 10-5B
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Figure 10-5A. Fluid and Air Components

FIG. & ITEM NO.	PART NUMBER	SVC	DESCRIPTION	UNITS PER ASSEMBLY					
				89A1	90B1	90A1	90A2	99A1	99A2
10-5A-			FLUID AND AIR COMPONENTS	X	X	X	X	X	X
1	200655		ASSEMBLY, Drain Block (See Fig. 10-9)	1	1	1	1	1	1
2	100596		GASKET, Drain Block To Heater	1	1	1	1	1	1
3	100681		GASKET, Heater Element	1	1	1	1	1	1
4	452202		BOLTS, Heater Housing, 5/16-18 x 7/8 Lg.	8	8	8	8	8	8
5	450209		WASHER, Lock, 5/16	8	8	8	8	8	8
6	450210		WASHER, Flat, 5/16	8	8	8	8	8	8
7	100614		DRAIN, Transition Block	1	1	1	1	1	1
8	452001		SCREW, Button Head, #10-32 x 3/8 lg.	6	6	6	6	6	6
9	450201		WASHER, Lock, #10	8	8	8	8	8	8
10	450211		WASHER, Flat, #10	12	12	12	12	12	12
11	200176		PUMP, High Pressure	1	1	–	1	–	1
	200156		PUMP, High Pressure (230V 50 Hz International)	–	–	1	–	1	–
	200697		• POPPETS, High Pressure Pump	2	2	2	2	2	2
12	453005		NUT, Hex. #10-32	2	2	2	2	2	2
13	100523		BRACKET, Pump	1	1	1	1	1	1
14	452105		SCREW, Button Head, 1/4-20 x 3/8 Lg.	4	4	4	4	4	4
15	100590		CUSHION, Pump Bracket	1	1	1	1	1	1
16	450207		WASHER, Lock, 1/4-20	4	4	4	4	4	4
17	450208		WASHER, Flat, 1/4-20	4	4	4	4	4	4
18	453006		WASHER, Nut, 1/4-20	4	4	4	4	4	4
19	400277		STUD, Mounting Plate	4	4	4	4	4	4
20	200740		ASSEMBLY, Circulation Pump, Magnetic Drive	1	1	–	1	–	1
	200966		IMPELLER KIT (for Circulation Pumps manufactured by Gormann-Rupp only)						
	200739		ASSEMBLY, Circulation Pump, Magnetic Drive (International 230V)	–	–	1	–	1	–
	200966		IMPELLER KIT (for Circulation Pumps manufactured by Gormann-Rupp only)						
21	200654		ASSEMBLY, Pinch Valve Branch	1	1	1	1	1	1
22	400060		BODY, Valve	2	2	2	2	2	2
23	400063		SLEEVE, Valve	2	2	2	2	2	2
	400033		• GREASE, High Vacuum	A/R	A/R	A/R	A/R	A/R	A/R
	400032		• COMPOUND, Anti-Seize	A/R	A/R	A/R	A/R	A/R	A/R
24	100745		SHIM	A/R	A/R	A/R	A/R	A/R	A/R
25	400037		MOUNT, Adhesive Backed	A/R	A/R	A/R	A/R	A/R	A/R
26	100329		SHIM, Drain Block	3	3	3	3	3	3
27	400235		ADHESIVE, Loctite® 222	A/R	A/R	A/R	A/R	A/R	A/R
28	200181		BLOCK, HP Trans. with Concentration Probes	1	1	1	1	1	1
29	200155		ASSEMBLY, Cross Block	1	1	1	1	1	1
30	100359		GASKET, HP (transition block to circ pinch sleeve assembly)	1	1	1	1	1	1
31	452010		SCREW, Button Head, #10-32 x 5/8 Lg.	4	4	4	4	4	4
32	200137		ASSEMBLY, Heater Housing, Stainless Steel	1	1	1	1	1	1
33	500106		Heater Element (Not Shown)	1	1	–	1	–	1
34	500107		Heater Element (230V 50 Hz International) (Not Shown)	–	1	1	–	1	–
35	450600		O-ring, Large	2	2	2	2	2	2
36	200154		VALVE, Dual Inlet Water (SOL5 & SOL7)	–	–	1	1	1	1
	200051		VALVE, Dual Inlet Water (SOL5 & SOL7)	1	1	–	–	–	–
37	400696		VALVE, Drain Check (CK8)	1	1	1	1	1	1
	200696		• KIT, Rebuild, CK8						
38	200160		ASSEMBLY, Air Manifold (See Fig. 10-6)	1	1	1	1	1	1
39	200042		ASSEMBLY, Float Block (See Fig. 10-7)	1	1	1	1	1	1
40	A1503		FILTER, Sterile (AIR)	1	1	1	1	1	1
41			HOUSING, Sterile Filter (See Figure 10-8)	1	1	1	1	1	1
42	200175		ASSEMBLY, Air Compressor (COMP)	–	–	–	1	–	1
	200050		ASSEMBLY, Air Compressor (COMP)	1	1	–	–	–	–
	200157		ASSEMBLY, Air Compressor (230V, 50Hz) (COMP)	–	–	–	1	–	1

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FIG. & ITEM NO.	PART NUMBER	SVC	DESCRIPTION	UNITS PER ASSEMBLY					
				89A1	90B1	90A1	90A2	99A1	99A2
10-5A- (continued)			**FLUID AND AIR COMPONENTS (continued)**	X	X	X	X	X	X
43	500019		SWITCH, THERMAL CUTOFF (LS1)	1	1	1	1	1	1
44	450612		O-ring, Small	1	1	1	1	1	1
45	A1525		FILTER, Sterile	1	1	1	1	1	1
46	400219		VALVE, Anti-siphon Check (CK10)	1	1	1	1	1	1

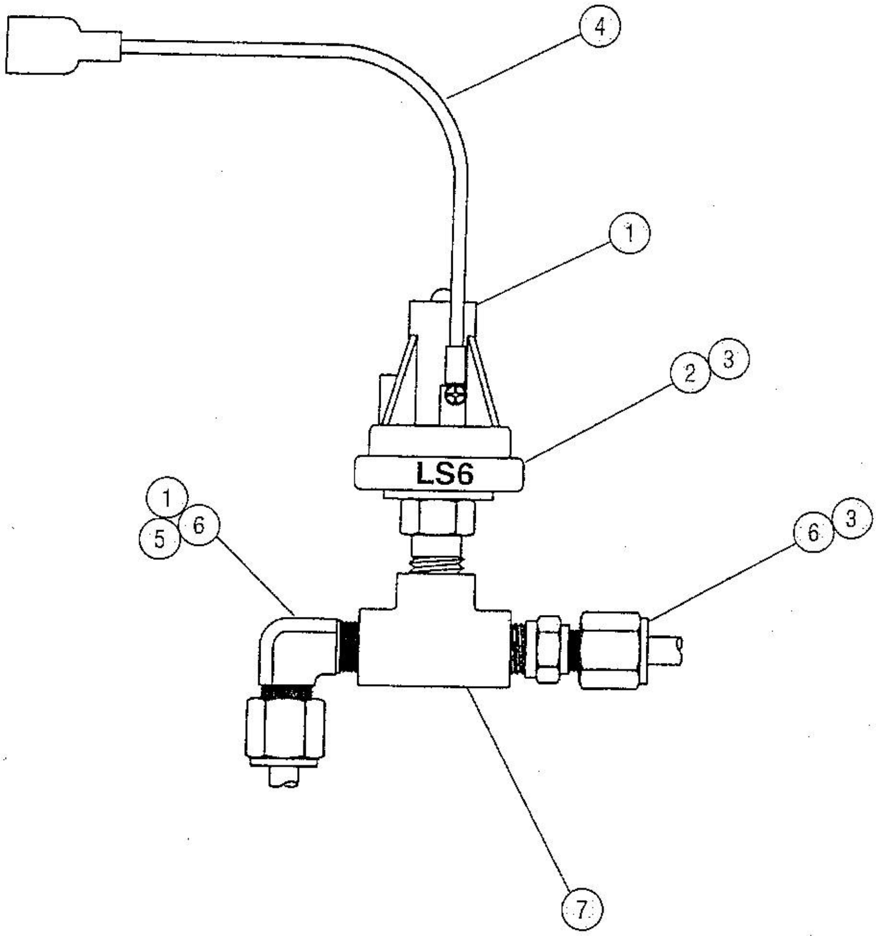
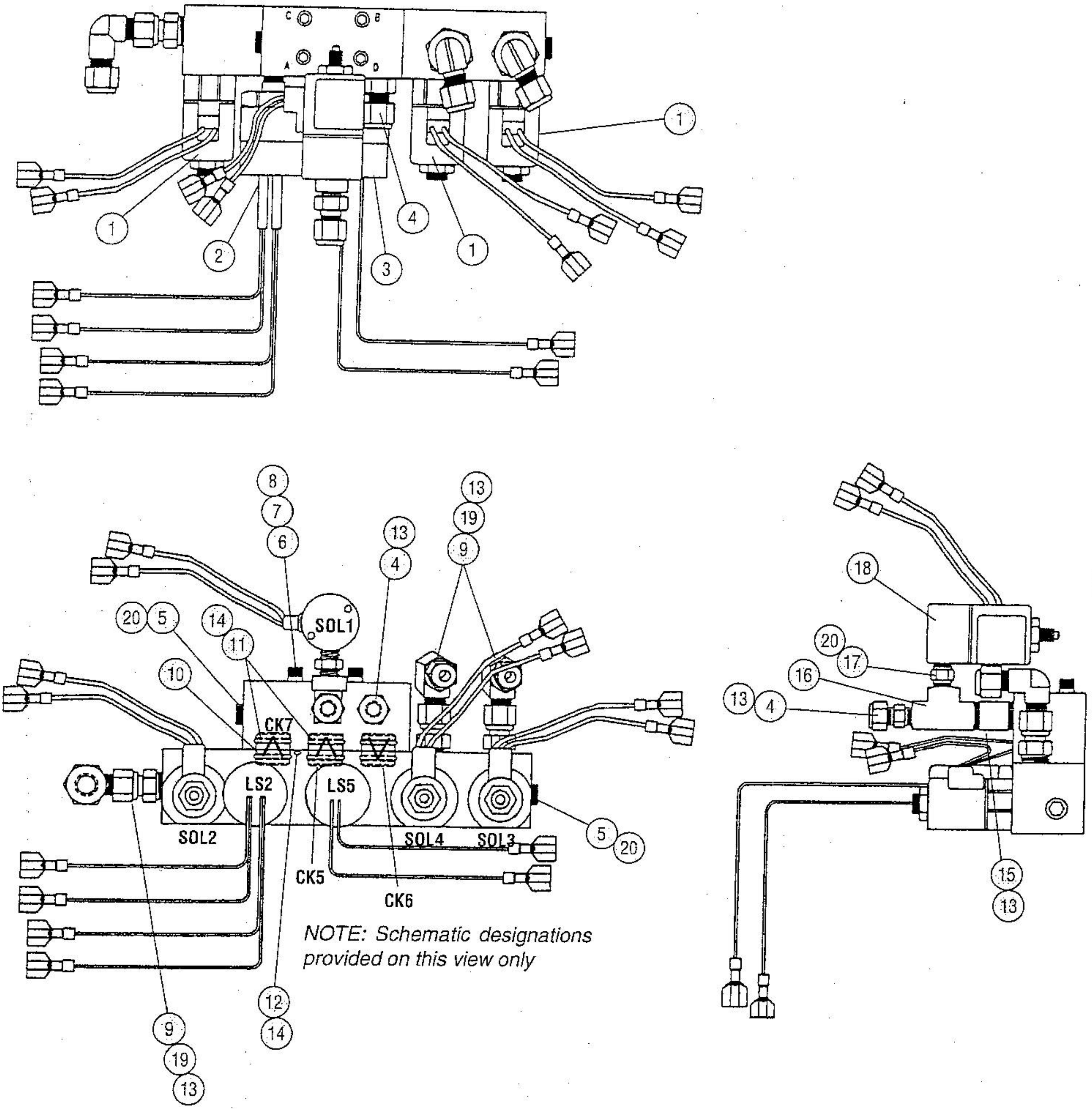

4
1
2
3
LS6
1
5
6
6
3
7

Figure 10-5B. Fluid and Air Components

FIG. & ITEM NO.	PART NUMBER	SVC	DESCRIPTION	UNITS PER ASSEMBLY					
				89A1	90B1	90A1	90A2	99A1	99A2
10-5B-			FLUID AND AIR COMPONENTS	X	X	X	X	X	X
1	200777	*	ASSEMBLY, Pressure Switch	1	1	1	1	1	1
2	500121		• SWITCH, Pressure (H.P. Pump Monitor)(LS6)	1	1	1	1	1	1
3	400367		• TAPE, Teflon	A/R	A/R	A/R	A/R	A/R	A/R
4	300090		• ASSEMBLY, Cable	2	2	2	2	2	2
5	400142	**	• MALE ELBOW	1	1	1	1	-	-
6	400141	**	• MALE CONNECTOR	1	1	1	1	2	2
7	400038		• UNION TEE	1	1	1	1	1	1

* *If LS6 is located on High Pressure Pump (Item #11), use LS6 Relocation Kit, 200715 (not shown).*

** *Item #5 may not be applicable if LS6 switch has been relocated, item #6 will be in its place.*


C
B
A
D
1
1
2
3
4
1
8
7
6
13
4
13
19
9
20
5
14
11
10
SOL1
CK7
LS2
LS5
SOL2
SOL4
SOL3
5
20
CK5
CK6
12
14
9
19
13
18
20
17
16
13
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15
13

NOTE: Schematic designations provided on this view only

Figure 10-6. Air Manifold Assembly

FIG. & ITEM NO.	PART NUMBER	SVC	DESCRIPTION	UNITS PER ASSEMBLY					
				89A1	90B1	90A1	90A2	99A1	99A2
10-6-	200160		**AIR MANIFOLD ASSEMBLY**			X	X	X	X
	200136	*	**AIR MANIFOLD ASSEMBLY**	X	X				
			** Assembly 200136 is NLA, order parts separately from list below.*						
1	200189	1	VALVE, Solenoid (SOL2, SOL3, SOL4)	–	–	3	3	3	3
	500016	1	VALVE, Solenoid (SOL2, SOL3, SOL4)	3	3	–	–	–	–
2	300136	2	ASSEMBLY, Seal Pressure Safety Switch (LS2)	1	1	1	1	1	1
	300052	2	ASSEMBLY, Seal Pressure Safety Switch (LS2)	1	1	–	–	–	–
3	300137	2	ASSEMBLY, Compressor Control Switch (LS5)	1	1	1	1	1	1
4	400141		CONNECTOR, Male	2	2	2	2	2	2
5	400055		PLUG, Hex Head	2	2	2	2	2	2
6	451913		SCREW, #8-32 x 1-1/2" Lg.	4	4	4	4	4	4
7	450215		LOCKWASHER, #8	4	4	4	4	4	4
8	400034		LOCTITE, 242	A/R	A/R	A/R	A/R	A/R	A/R
9	400140		ELBOW	3	3	3	3	3	3
10	400390	3	VALVE, Air Manifold Check (CK5, CK6, CK7)	3	3	3	3	3	3
11	450606		O-ring	6	6	6	6	6	6
12	450617	4	O-ring	1	1	1	1	1	1
13	400036		SEALANT, Thread	A/R	A/R	A/R	A/R	A/R	A/R
14	400035		LUBRICANT, O-ring	A/R	A/R	A/R	A/R	A/R	A/R
15	400087		NIPPLE, Long	1	1	1	1	1	1
16	400088		TEE, 1/8 NPT	1	1	1	1	1	1
17	400089		NIPPLE, Hex	1	1	1	1	1	1
18	200188	5	VALVE, Compressor Release Solenoid (SOL1)	–	–	1	1	1	1
	500023	5	VALVE, Compressor Release Solenoid (SOL1)	1	1	–	–	–	–
19	400139		ADAPTER, Tube, Male	3	3	3	3	3	3
20	400367	2,6	TAPE, Teflon, 1/4" Wide	A/R	A/R	A/R	A/R	A/R	A/R

NOTES:

[1] *Do not apply Loctite or O-ring lubricant to the Solenoid Valves' (Item #1) threaded stems.*

[2] *Apply 2-1/2 wraps of Teflon Tape (Item #20) and torque pressure Switches (Items #2 & #3) to 55 in/lbs.*

[3] *Apply a thin film of O-ring lubricant to exposed surface of both O-rings.*

[4] *Apply a thin film of O-ring lubricant to all surfaces of O-ring install carefully, minimizing stretch.*

[5] *Apply 2 wraps of Teflon Tape (Item #20) before installing Solenoid (Item #18), start 1 to 2 threads from end.*

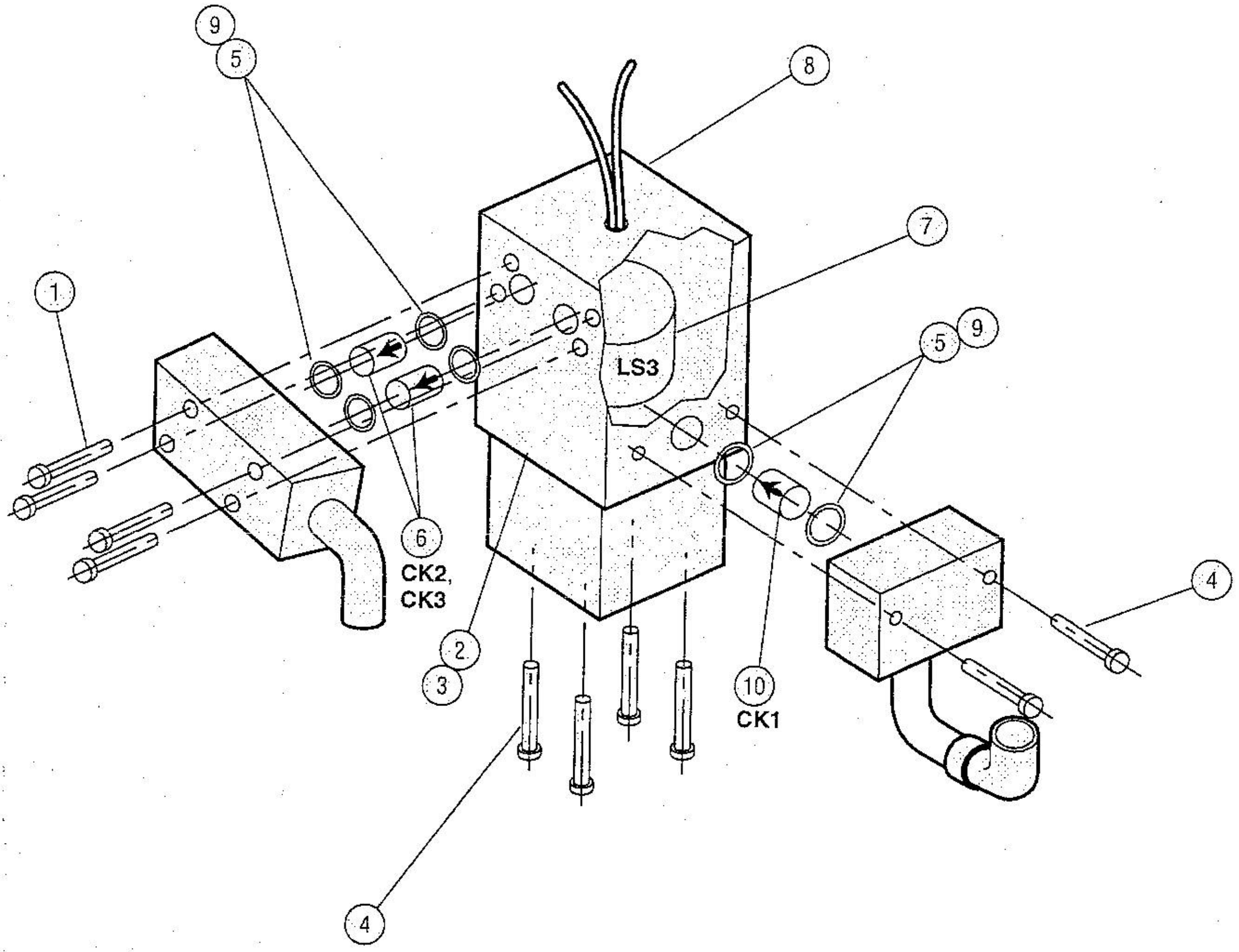
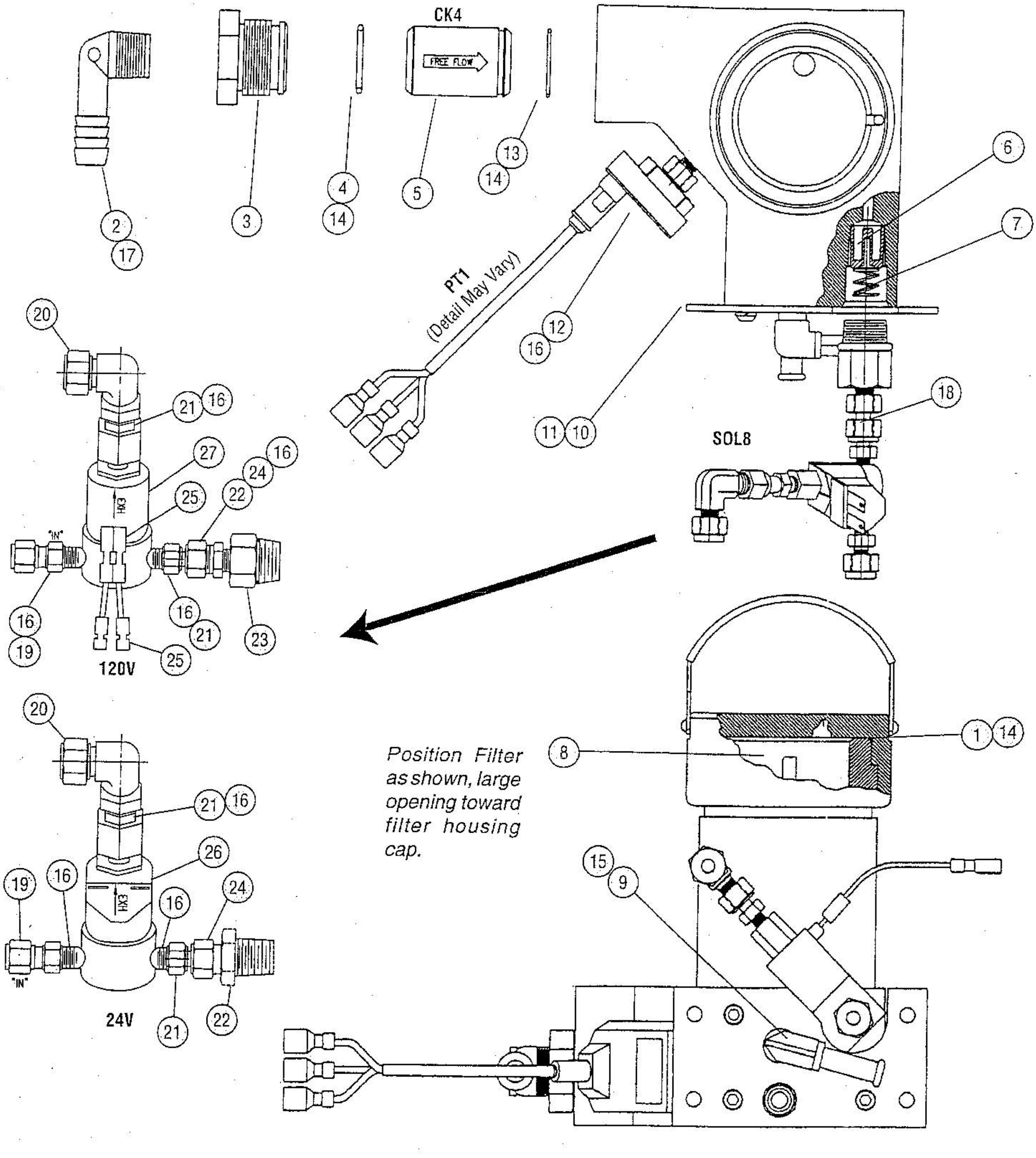

9
5
8
7
1
LS3
5
9
6
CK2,
CK3
4
2
3
10
CK1
4

Figure 10-7. Float Block Switch Assembly (LS3)

FIG. & ITEM NO.	PART NUMBER	SVC	DESCRIPTION	UNITS PER ASSEMBLY					
				89A1	90B1	90A1	90A2	99A1	99A2
10-7-	200042		**FLOAT BLOCK SWITCH ASSEMBLY (LS3)**	X	X	X	X	X	X
1	451913		SCREW, Socket Head Cap, #8-32 x 1.5" Lg.	4	4	4	4	4	4
2	100222		GASKET, Float	1	1	1	1	1	1
3	100146		SCREEN, Filter	1	1	1	1	1	1
4	451908		SCREW, Socket Head Cap, #8-32 x 1.00 Lg.	6	6	6	6	6	6
5	450621	*	SILICONE, O-ring	A/R	A/R	A/R	A/R	A/R	A/R
6	400510		VALVE, Float Block Drain Check (CK2, CK3)	2	2	2	2	2	2
7	900005		ASSEMBLY, Float Block Switch (LS3)	1	1	1	1	1	1
8	950021		DISCONNECT, Insulated Male	2	2	2	2	2	2
9	400035		LUBRICANT, O-ring	A/R	A/R	A/R	A/R	A/R	A/R
10	400345		VALVE, Air Inlet Check, SS (CK1)	1	1	1	1	1	1
11	A1503		FILTER, Sterile Air (FLT2) (Not Shown)	1	1	1	1	1	1

NOTE:

** Apply a thin film of O-ring lubricant to entire outside diameter of O-ring. Install carefully; minimize stretching.*


CK4
FREE FLOW
2
17
3
4
14
5
13
14
6
7
PT1
(Detail May Vary)
12
16
11
10
18
SOL8
20
21
16
27
24
16
25
22
HX3
"IN"
16
19
16
21
23
25
120V
20
21
16
26
19
16
16
24
HX3
"IN"
21
22
24V
8
1
14
15
9

Position Filter as shown, large opening toward filter housing cap.

Figure 10-8. Sterile Filter Housing Assembly

FIG. & ITEM NO.		PART NUMBER		SVC	DESCRIPTION	UNITS PER ASSEMBLY					
						89A1	90B1	90A1	90A2	99A1	99A2
10-8-		200119			**STERILE FILTER HOUSING ASSEMBLY**	–	–	X	X	–	–
		200168			**STERILE FILTER HOUSING ASSEMBLY**	X	X	–	–	–	–
		200792			**STERILE FILTER HOUSING ASSEMBLY**	–	–	–	–	X	X
1		200118		1	ASSEMBLY, Filter Housing Cap	1	1	1	1	1	1
2		400358			ELBOW, 90°	1	1	1	1	1	1
3		100612			CONNECTOR, Male	1	1	1	1	1	1
4		450608			SILICONE, O-ring	1	1	1	1	1	1
5		400368			VALVE, Backflow Preventer Check (CK4)	1	1	1	1	1	1
		200226			KIT, Kepner Rebuild (CK4)	A/R	A/R	A/R	A/R	A/R	A/R
6		400080			FILTER	1	1	1	1	1	1
7		452802			SPRING, Compression	1	1	1	1	1	1
8		A1525			FILTER, Sterile Water	1	1	1	1	1	1
9		200027		2	SUBASSEMBLY, 90° Fitting	1	1	1	1	1	1
10		452100			SCREW, Hex Socket Button Head Cap	3	3	3	3	3	3
11		450207			LOCKWASHER, 1/4"	3	3	3	3	3	3
12	P	136817	134	3	ASSEMBLY, Pressure Tranducer (PT1)	–	–	–	–	1	1
		200141		3	ASSEMBLY, Pressure Tranducer (PT1)	1	1	–	–	–	–
		200164		3	• ASSEMBLY, Pressure Transducer (PT1)	–	–	1	1	–	–
		400115		3	• BUSHING, Reducer, 1/8" NPTF x 1/4" NPTM	1	1	–	–	–	–
13		450614			SILICONE, O-ring	1	1	1	1	1	1
14		400035		1	LUBRICANT, O-ring	A/R	A/R	A/R	A/R	A/R	A/R
15		400036		2	SEALANT, Thread	A/R	A/R	A/R	A/R	A/R	A/R
16		400367		3	TAPE, Thread Seal, 1/4" Wide	A/R	A/R	A/R	A/R	A/R	A/R
17		400150			TAPE, Thread Seal, 1/2" Wide (Not Shown)	A/R	A/R	A/R	A/R	A/R	A/R
18		200533			ASSEMBLY, Air-Water Solenoid Valve (SOL8)	X	X				
		200534			ASSEMBLY, Air-Water Valve Solenoid (SOL8)			X	X	X	X
19		400141			• CONNECTOR,Male	1	1	1	1	1	1
20		400140			• ELBOW, Union	1	1	1	1	1	1
21		400139			• ADAPTER, Tube	1	1	1	1	1	1
22		400143			• CONNECTOR, Male	–	–	1	1	1	1
23		100342			• ADAPTER, Modified Female Pipe	–	–	1	1	1	1
24		200578			• NUT, Fitting	1	1	1	1	1	1
		400247			• • FERRULE, Back	1	1	1	1	1	1
		400246			• • FERRULE, Front	1	1	1	1	1	1
25		300126			• CABLE, Electrical Jumper	1	1	–	–	–	–
26		500122			• ASSEMBLY, Air-Water Solenoid Valve (24V) (SOL8)	–	–	1	1	1	1
27		500123			• ASSEMBLY, Air-Water Solenoid Valve (120V) (SOL8)	1	1	–	–	–	–

NOTE:

[1] *Appy a light film of O-ring lubricant (Item #14) to the O-ring in the Filter Housing Cap (Item #1) before fitting the Cap to the Filter Housing.*

[2] *Do not apply Thread Sealant (Item #15) to the first two threads on this fitting.*

[3] *Apply 2 turns of Thread Seal Tape (Item #16) to threads on the Pressure Transducer (Item #12). Do not apply tape to the first two threads.*

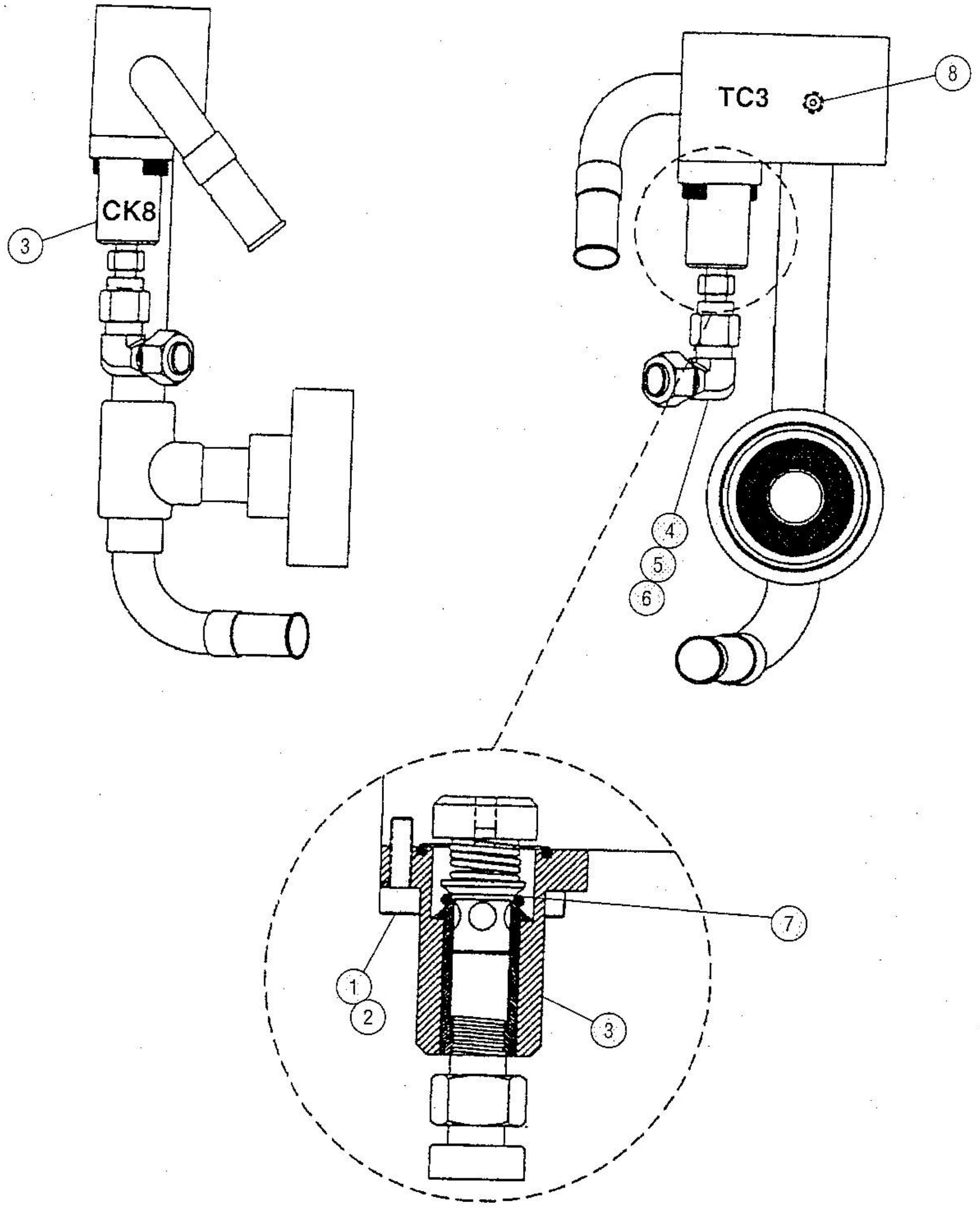

CK8
3
TC3
8
4
5
6
7
1
2
3

Figure 10-9. Drain Block Assembly

FIG. & ITEM NO.	PART NUMBER	SVC	DESCRIPTION	UNITS PER ASSEMBLY					
				89A1	90B1	90A1	90A2	99A1	99A2
10-9-	200655		**DRAIN BLOCK ASSEMBLY**	X	X	X	X	X	X
1	452000		SCREW, Hex Head	2	2	2	2	2	2
2	450201		LOCKWASHER, Split, #10	2	2	2	2	2	2
3	400696		ASSEMBLY, Drain Check Valve, 6 psi (CK8)	1	1	1	1	1	1
4	400140		ELBOW, Male 1/4 Tube Swage Lock, #8-400-9	1	1	1	1	1	1
5	400136	*	SEALANT, Thread Locking, Loctite #59231	A/R	A/R	A/R	A/R	A/R	A/R
6	400138		ADAPTER, Male Tube, 1/8 NPT Cajon #8-4-TA-1-2	1	1	1	1	1	1
7	200696		KIT, Rebuild, CK8, (includes O-Ring and Springs)	A/R	A/R	A/R	A/R	A/R	A/R
8	100520		THERMOCOUPLE #3 (TC3) (Not included in drain block assembly)	1	1	1	1	1	1

** Limit use of thread sealant to a minimum. Do not contaminate internal orifice.*

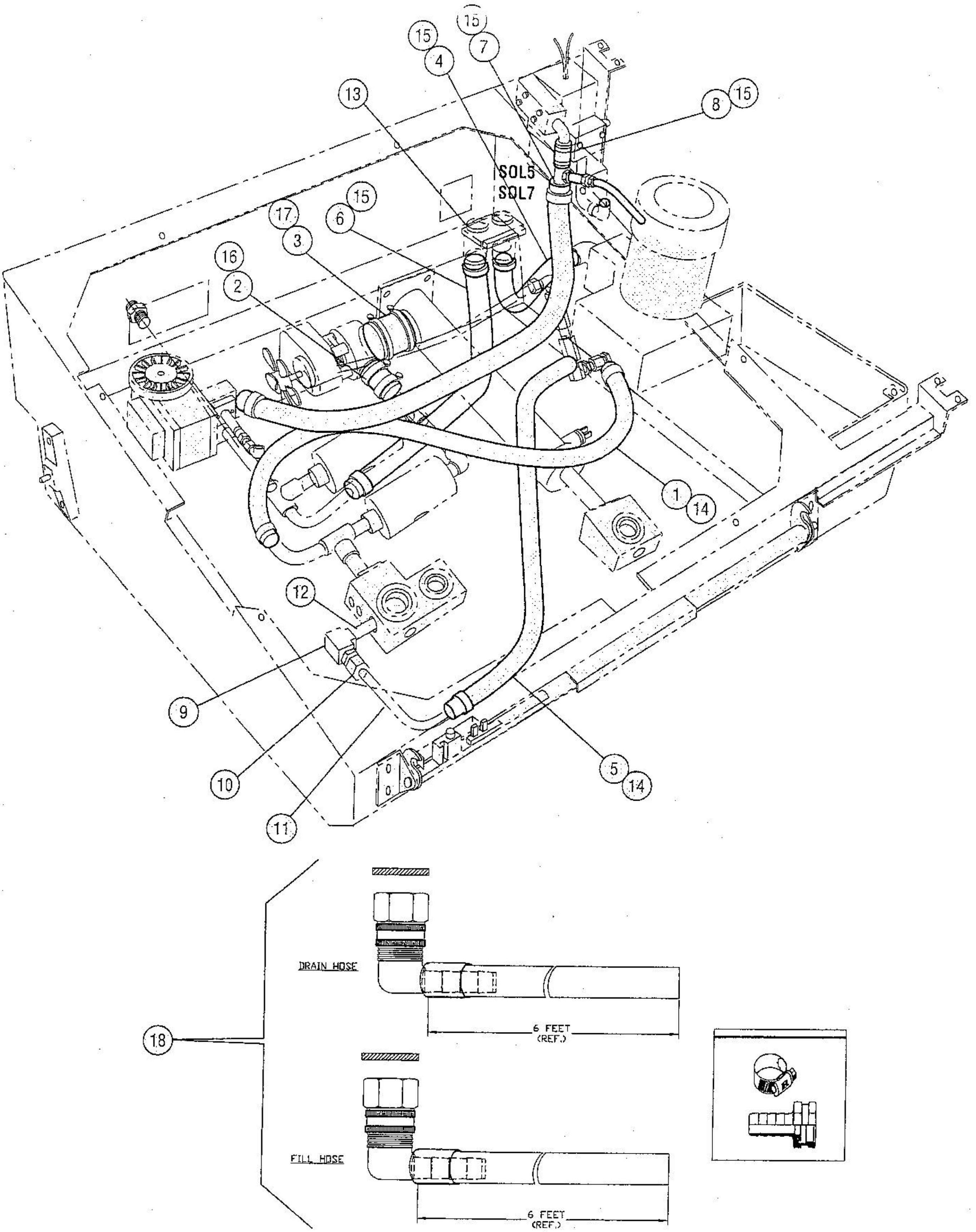
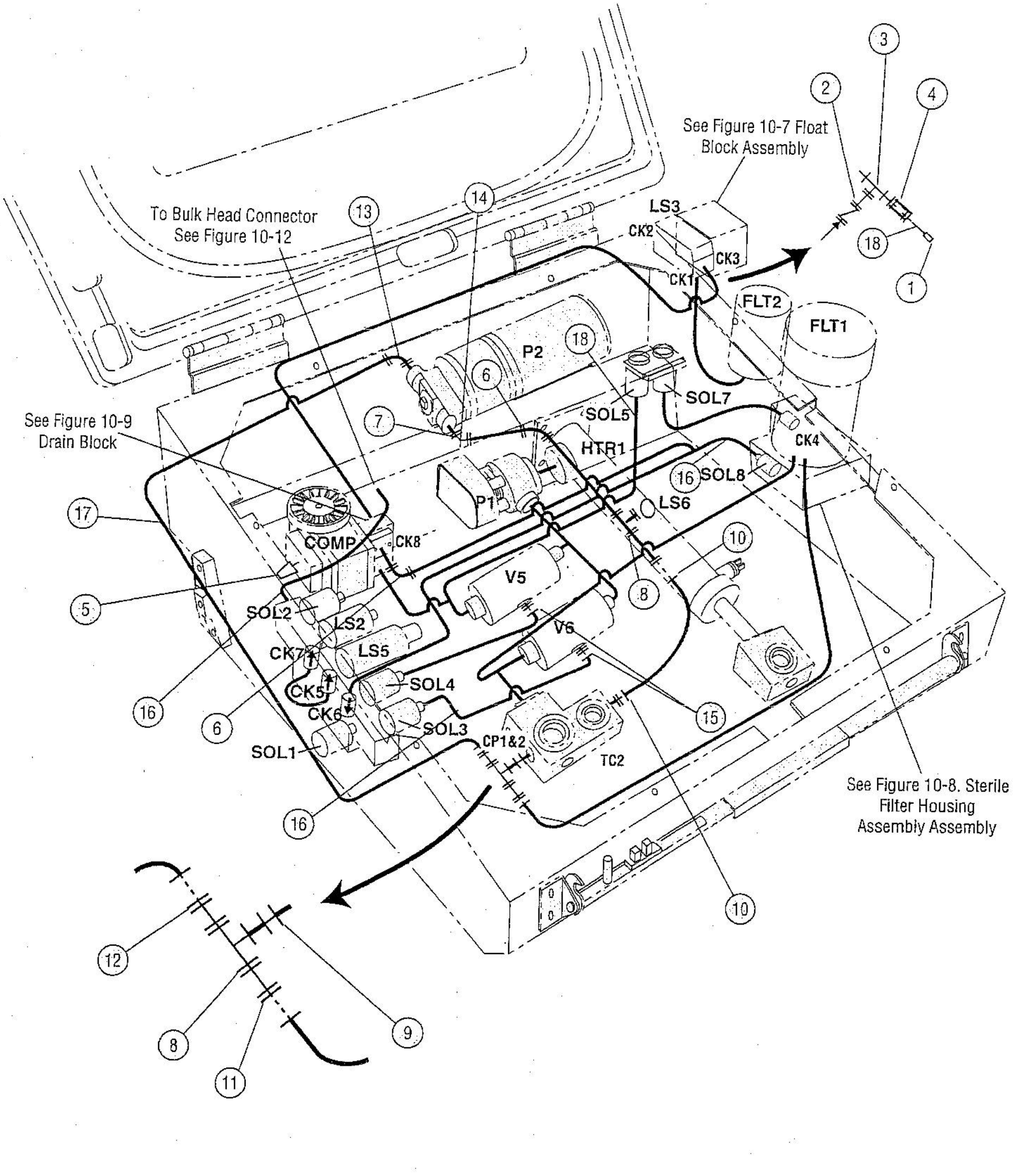

15
15
4
7
13
8
15
SOL5
SOL7
17
15
6
3
16
2
1
14
12
9
10
11
5
14
18
DRAIN HOSE
6 FEET
(REF.)
FILL HOSE
6 FEET
(REF.)

Figure 10-10. Water Hoses

FIG. & ITEM NO.	PART NUMBER	SVC	DESCRIPTION	UNITS PER ASSEMBLY					
				89A1	90B1	90A1	90A2	99A1	99A2
10-10-			WATER HOSES	X	X	X	X	X	X
1	613000		HOSE, 3/8" I.D. x 25" Lg.	1	1	1	1	1	1
2	613002		HOSE, 7/8" I.D. x 1-1/4" Lg.	1	1	1	1	1	1
3	613003		HOSE, 1-1/4' I.D. x 1-7/8" Lg.	1	1	1	1	1	1
4	613001		HOSE, 1/2" I.D. x 6-1/2" Lg.	1	1	1	1	1	1
5	613000		HOSE, 3/8" I.D. x 22-1/2" Lg.	1	1	1	1	1	1
6	613001		HOSE, 1/2" I.D. x 20-1/2" Lg.	1	1	1	1	1	1
7	613001		HOSE, 1/2" I.D. x 21-1/2" Lg.	1	1	1	1	1	1
8	613001		HOSE, 1/2" I.D. x 2-1/2" Lg.	1	1	1	1	1	1
9	400088		TEE, Union	1	1	1	1	1	1
10	400366		CONNECTOR, Male	1	1	1	1	1	1
11	100373		TUBE, Filter Return	1	1	1	1	1	1
12	400087		NIPPLE, Pipe	1	1	1	1	1	1
13	200154		VALVE, Dual Water Inlet (SOL5 & SOL7)	–	–	1	1	1	1
	200051		VALVE, Dual Water Inlet (SOL5 & SOL7)	1	1	–	–	–	–
14	450510		CLAMP, For 3/8" ID Hose	A/R	A/R	A/R	A/R	A/R	A/R
15	450507		CLAMP, For 1/2" ID Hose	A/R	A/R	A/R	A/R	A/R	A/R
16	450508		CLAMP, For 7/8" ID Hose	A/R	A/R	A/R	A/R	A/R	A/R
17	450509		CLAMP, For 1-1/4" ID Hose	A/R	A/R	A/R	A/R	A/R	A/R
18	200960		ASSEMBLY, Hose	1	1	1	1	1	1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See Figure 10-7 Float Block Assembly
LS3
CK2
CK3
CK1
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To Bulk Head Connector See Figure 10-12
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FLT2
FLT1
P2
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SOL5
SOL7
See Figure 10-9 Drain Block
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HTR1
CK4
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SOL8
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LS6
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COMP
CK8
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V5
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SOL2
LS2
V6
LS5
CK7
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SOL4
CK5
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CK6
SOL3
SOL1
CP1&2
TC2
See Figure 10-8. Sterile Filter Housing Assembly Assembly
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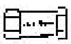
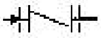
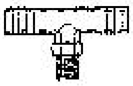
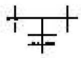
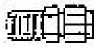
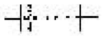
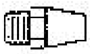
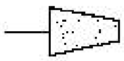
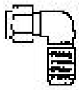
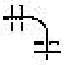
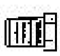
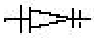
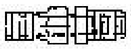
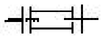
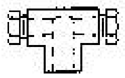
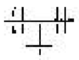
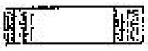
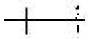
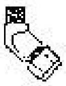
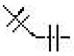
Figure 10-11. Piping and Components

FIG. & ITEM NO.	PART NUMBER	SVC	DESCRIPTION	UNITS PER ASSEMBLY 89A1	90B1	90A1	90A2	99A1	99A2
10-11-			**PIPING AND COMPONENTS**	X	X	X	X	X	X
			(Locations represented by schematic designations)						
1	100459		CONNECTOR, Tubing, Modified, (CK10)	1	1	1	1	1	1
2	400219		VALVE, Anti-siphon Check (CK10) (Type A)	1	1	1	1	1	1
3	400142		ELBOW, Male (CK10) (Type E)	1	1	1	1	1	1
4	400427		HOSE, Barb (CK10) (Type G)	1	1	1	1	1	1
5	400267		SILENCER, Air (COMP) (Type D)	1	1	1	1	1	1
6	400142		ELBOW, Male (COMP) (Type E)	1	1	1	1	1	1
7	400272		BUSHING (P2) (Type F)	1	1	1	1	1	1
8	400088		TEE, Union, 1/8" NPT (LS6) (Type H)	1	1	1	1	1	1
9	400087		NIPPLE, Pipe (TC2) (Type J)	1	1	1	1	1	1
10	400141		CONNECTOR, Male (CP1&2) (Type C)	1	1	1	1	1	1
11	400366		CONNECTOR, Male (CP1&2) (Type C)	1	1	1	1	1	1
12	400375		CONNECTOR, Male (CP1&2) (Type C)	1	1	1	1	1	1
13	400376		ELBOW, Male, 90° (P2) (Type E)	2	2	2	2	2	2
14	450836		ELBOW, Male, 45° (P2) (Type K)	2	2	2	2	2	2
15	400143		CONNECTOR, Male (Pinch Valve) (Type C)	2	2	2	2	2	2
16	613009		TUBING, Polyethylene, 3/16" ID x .25 OD	A/R	A/R	A/R	A/R	A/R	A/R
17	613027		TUBING, Polyethylene, 1/4" ID x .25 OD	A/R	A/R	A/R	A/R	A/R	A/R
18	613007		TUBING, Polyethylene, 1/4" ID x .375 OD	A/R	A/R	A/R	A/R	A/R	A/R
19	400245		PADDING, Foam, Black (Not Shown)	A/R	A/R	A/R	A/R	A/R	A/R

Type	Valve	Description	Symbol
A		Valve-Check Flanged	
B		Tee - Male Branched/NPT	
C		Connector - Male	
D		Silencer	
E		Elbow - 90°	
F		Bushing	
G		Hose Barb - Compression	
H		Tee - Male Compression	
J		Nipple - Pipe	
K		Elbow - 45°	

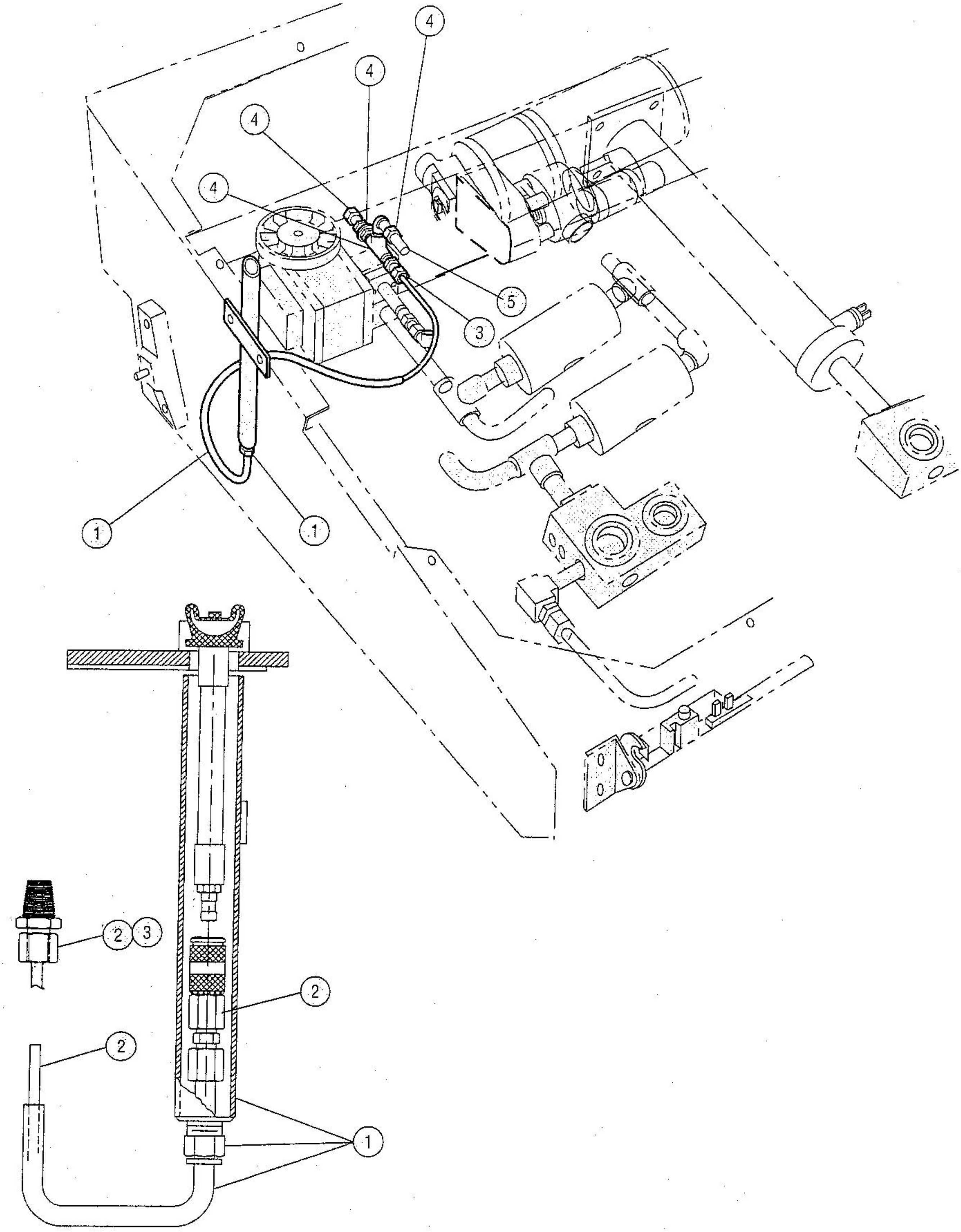

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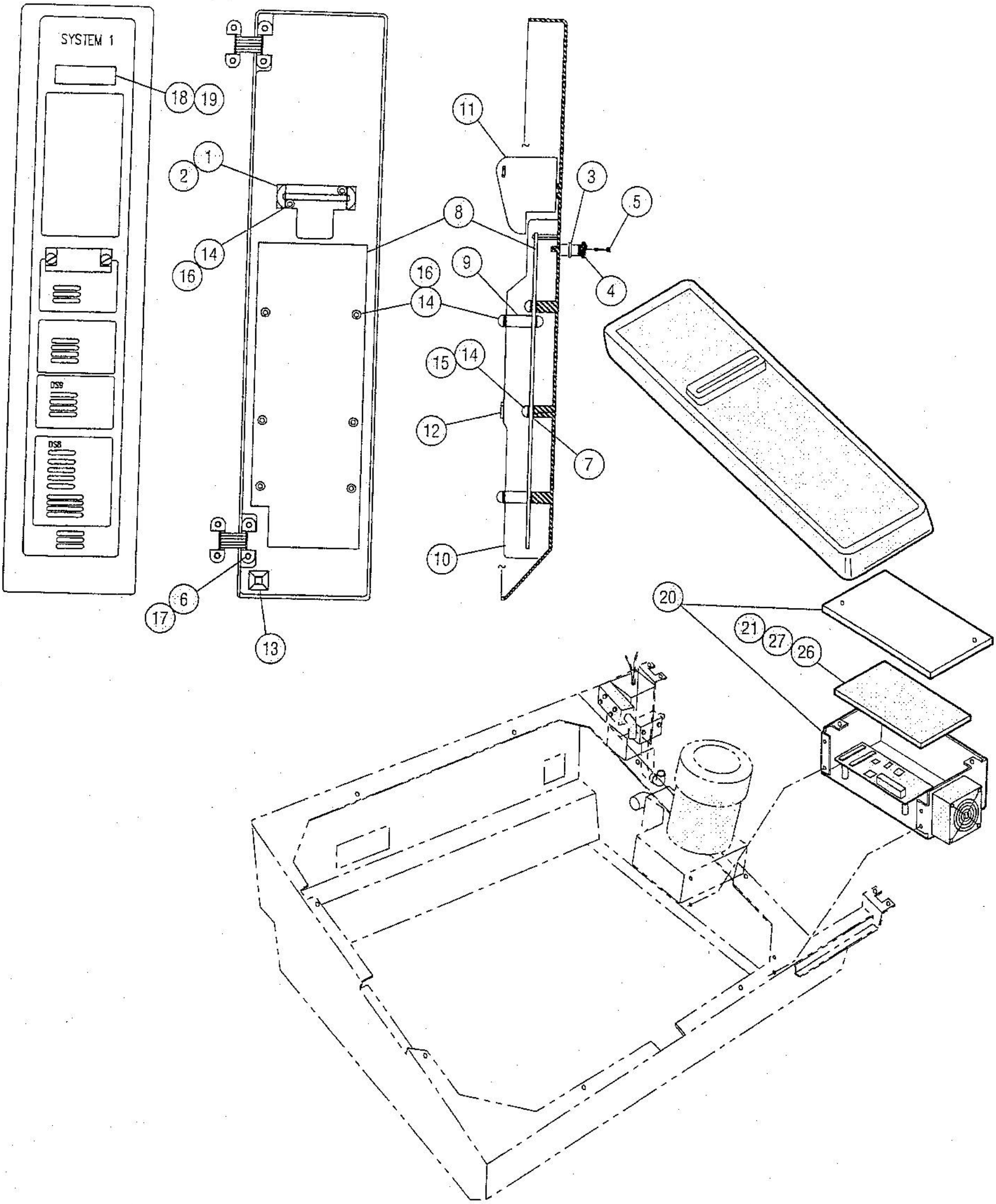
Figure 10-12. Bulkhead Connector Assembly

FIG. & ITEM NO.	PART NUMBER	SVC	DESCRIPTION	UNITS PER ASSEMBLY					
				89A1	90B1	90A1	90A2	99A1	99A2
10-12-			**BULKHEAD CONNECTOR ASSEMBLY**	X	X	X	X	X	X
1	200179		ASSEMBLY, Guide Tube	1	1	1	1	1	1
2	200180		LINE, Air, Quick Disconnect	1	1	1	1	1	1
3	400268		• CONNECTOR, Tube	1	1	1	1	1	1
	400294		• FERRULE, Spark	1	1	1	1	1	1
4	200173		ASSEMBLY, Bulkhead Connector	1	1	1	1	1	1
5	613009		TUBE, 3/16" ID x .250" OD	A/R	A/R	A/R	A/R	A/R	A/R


SYSTEM 1
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DS9
DS8
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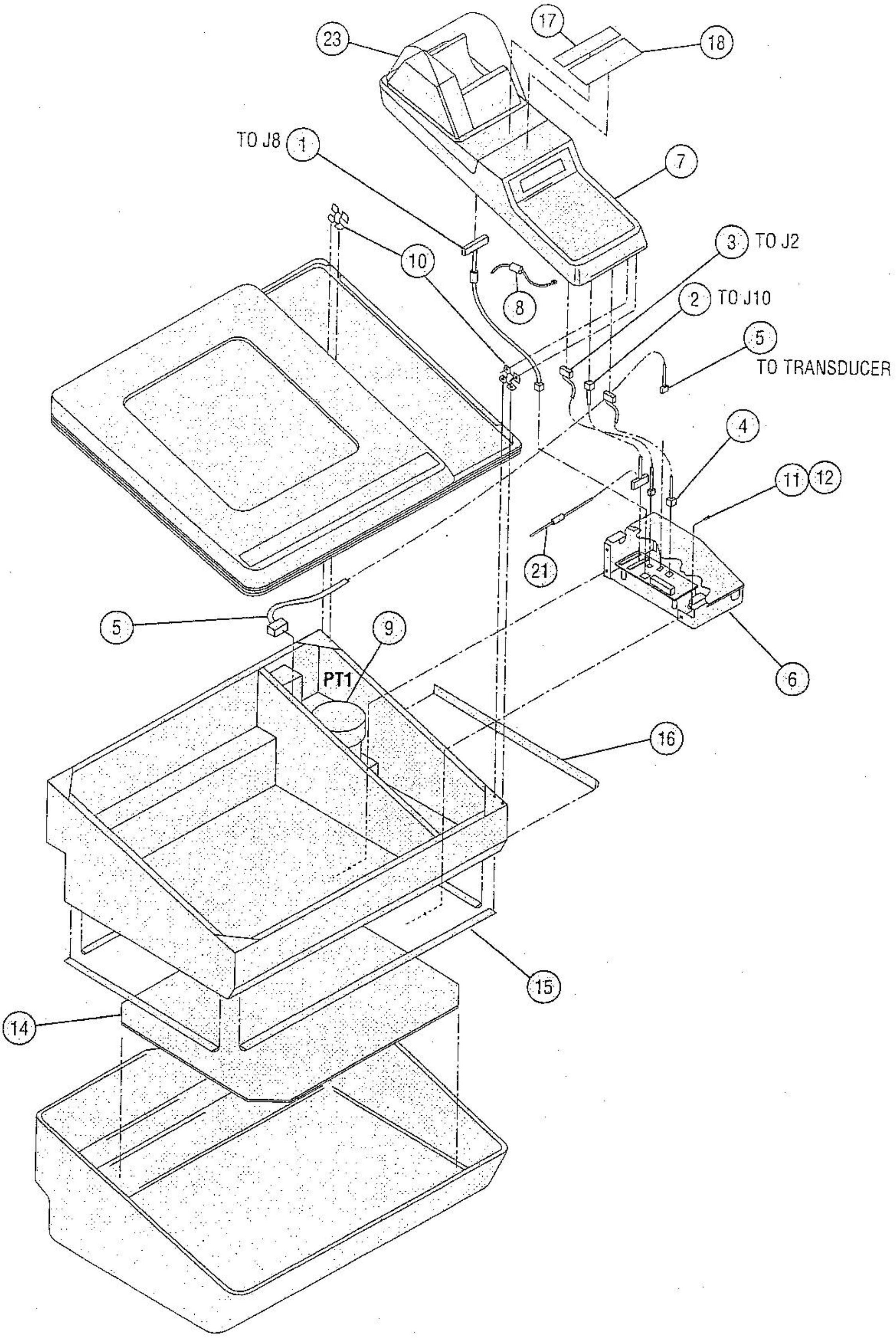
Figure 10-13. Control Assembly – 89 and 90 Models Only

FIG. & ITEM NO.	PART NUMBER	SVC	DESCRIPTION	UNITS PER ASSEMBLY 89A1	90B1	90A1	90A2	99A1	99A2
10-13-			CONTROL ASSEMBLY – 89/90 MODELS ONLY	X	X	X	X		
1	100517		HOLDER, Printer Paper	1	1	1	1		
	A1700		• PAPER, Printer (5 Rolls)	1	1	1	1		
2	100153		SPINDLE	1	1	1	1		
3	100518		GASKET	1	1	1	1		
4	100514		BEZEL	1	1	1	1		
5	400266		SCREW, Captive Panel (Bezel Thumbscrew)	2	2	2	2		
6	400023		HINGE	2	2	2	2		
7	450222		WASHER, Insulating	6	6	6	6		
8	300106		BOARD, Printer/Display	1	1	1	1		
9	451205		SPACER, 4-40 x 3/4"	2	2	2	2		
10	101016		COVER, P.C. Board	1	1	1	1		
11	101015		COVER, Paper Roll	1	1	1	1		
12	400312		PLUG, Hole	1	1	1	1		
13	400037		ADHESIVE, Backed Mount	1	1	1	1		
14	450206		LOCKWASHER, #4	10	10	10	10		
15	451602		SCREW, #4-40 x 3/8" Lg.	4	4	4	4		
16	451604		SCREW, #4-40 x 1/4" Lg.	6	6	6	6		
17	451800		SCREW, #6-32 x 3/8" Lg.	4	4	4	4		
18	100539		LABEL, Flammable Anesthetics (German)	–	–	1	–		
	100665		LABEL, Flammable Anesthetics (Italian)	–	–	1	–		
	100666		LABEL, Flammable Anesthetics (French)	–	–	1	1		
	100778		LABEL, Flammable Anesthetics (Spanish)	–	–	1	1		
	400203		LABEL, Flammable Anesthetics (English)	1	1	1	1		
19	100509		MEMBRANE, Panel (German)	–	–	1	–		
	100660		MEMBRANE, Panel (Italian)	–	–	1	–		
	100510		MEMBRANE, Panel (French)	–	–	1	1		
	100511		MEMBRANE, Panel (Spanish)	–	–	1	1		
	200282		MEMBRANE, Panel (English)	–	1	1	1		
	200278		MEMBRANE, Panel (English)	1	–	–	–		
20	200184		ASSEMBLY, Electronic Enclosure (See Fig. 10-17)	1	1	1	1		
21	500159		EPROM (English)	1	1	–	1		
	500161		EPROM (UK)	–	–	1	–		
	500160		EPROM (Australian)	–	–	1	–		
	500165		EPROM (Italian)	–	–	1	–		
	500168		EPROM (Spanish)	–	–	1	1		
	500167		EPROM (German)	–	–	1	–		
	500169		EPROM (French)	–	–	1	1		
22			(Item Not Used)	–	–	–	–		
23	A1730		REEL, Printer Take-up (Accessory) (Not Shown)	A/R	A/R	A/R	A/R		
24	300014		CABLE, Ribbon (From Controller to Printer) (Not Shown)	1	1	1	1		
25	300076		BOARD, Control, P.C. Interface (Not Shown)	1	1	–	–		
26	300086		BOARD, Control, P.C. Interface	–	–	1	1		
27	53B04700		• CHIP, Battery RAM	–	–	1	1		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TO J10
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TO TRANSDUCER
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15
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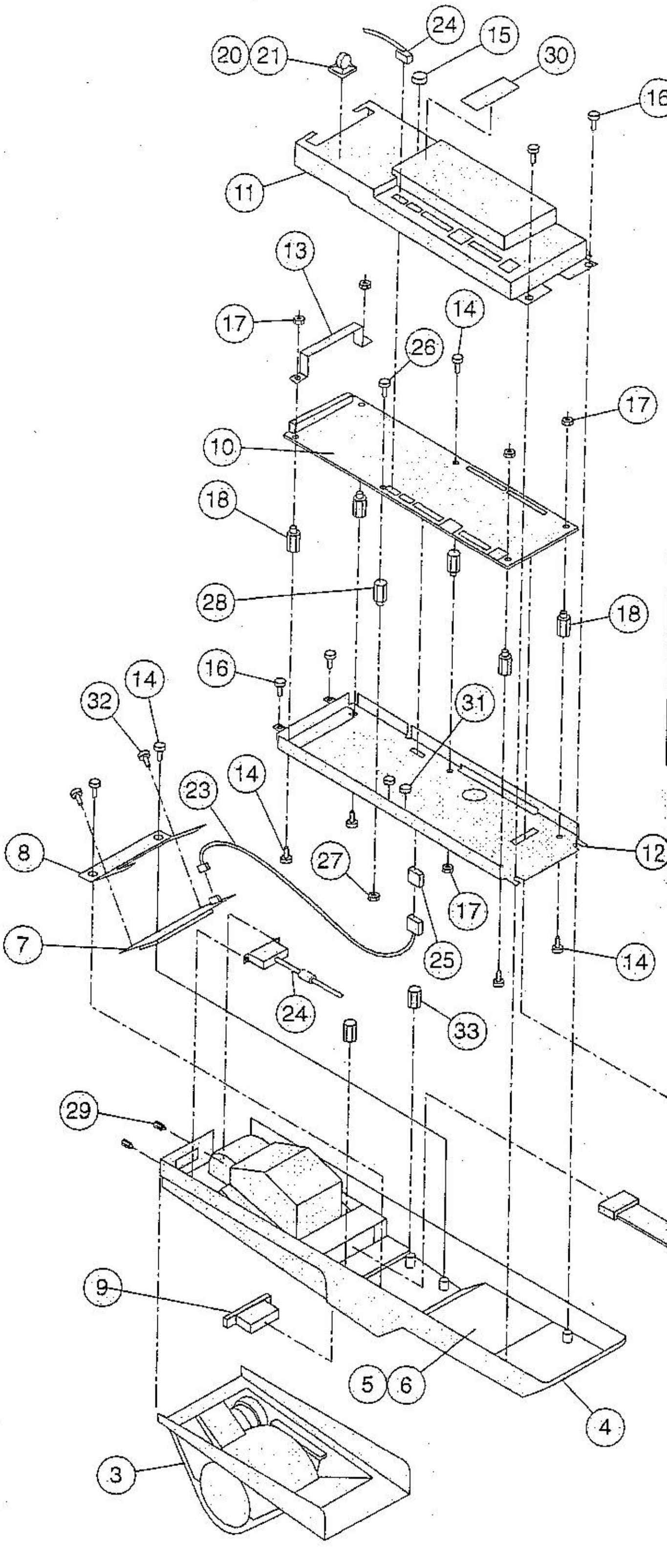
Figure 10-14. Control Assembly – 99A1 and A2 Models Only

FIG. & ITEM NO.	PART NUMBER			SVC	DESCRIPTION	UNITS PER ASSEMBLY					
						89A1	90B1	90A1	90A2	99A1	99A2
10-14-	P	146665	366		**CONTROL ASSEMBLY – 99A1/A2 MODELS ONLY**					X	X
1	P	146665	364		AC OUTPUT HARNESS (See Figure 10-24)					1	1
2	P	146665	365		DC POWER HARNESS (See Figure 10-23)					1	1
3	P	146665	363		DC INPUT HARNESS (See Figure 10-22)					1	1
4	P	146665	362		ANALOG HARNESS (See Figure 10-21)					1	1
5	P	136817	135		TRANSDUCER WIRE HARNESS (See Figure 10-20)					1	1
6	P	146665	358		INTERFACE BOX ASSEMBLY (See Figure 10-18)					1	1
7					CONTROL ASSEMBLY (See Figure 10-15)					1	1
8	P	093922	489		GROUND STRAP ASSEMBLY					2	2
9	P	136817	134		TRANSDUCER, PRESSURE (PT1)					1	1
10		451800			HINGE MOUNTING HARDWARE					4	4
11		451904			SCREWS, Button Head, #8-32 x 1/2 Lg					3	3
12		450215			LOCKWASHER, #8					3	3
13		500173		*	LID SWITCH (LS4) (Not Shown)					1	1
14	P	136817	139		COVER, Shield					1	1
15		613046			EMI GASKET, 18" Lg					A/R	A/R
16		613046			EMI GASKET, 10-1/2" Lg					A/R	A/R
17	P	093922	487		LABEL, Warning ("Flammable" - English)					1	1
	P	093922	490		LABEL, Warning (French)					1	1
	P	093922	491		LABEL, Warning (Spanish)					1	1
	P	093922	492		LABEL, Warning (German)					1	–
	P	093922	493		LABEL, Warning (Italian)					1	–
18	P	093922	488		LABEL, Important (English)					1	1
	P	093922	494		LABEL, Important (French)					1	1
	P	093922	495		LABEL, Important (Spanish)					1	1
	P	093922	496		LABEL, Important (German)					1	–
	P	093922	497		LABEL, Important (Italian)					1	–
19		400001			WIRE TIE MOUNT (Not Shown)					A/R	A/R
20		400037			WIRE TIE (Not Shown)					A/R	A/R
21		550024			QUICK DISCONNECT WIRE TERMINAL					1	1
22	P	129352	049		WIRE CRIMP NUT (Not Shown)					2	2
23	P	129376	375		TAKE-UP HOUSING COVER KIT (See Figure 10-16)					1	1
24		613045			TUBING, Corrugated Split Wall (Not Shown)					1	1
25	P	129362	819		PRINTER PAPER (3 Rolls) (Not Shown)					A/R	A/R
26	P	150828	440		RIBBON CARTRIDGE (Epson Printer) (Box of 2) (Not Shown)					A/R	A/R

* *If replacing Lid Switch 500009 with current Lid Switch 500173, discard PC Board 300113.*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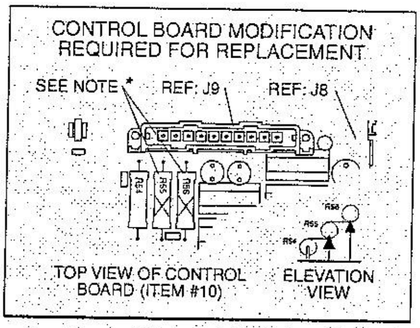
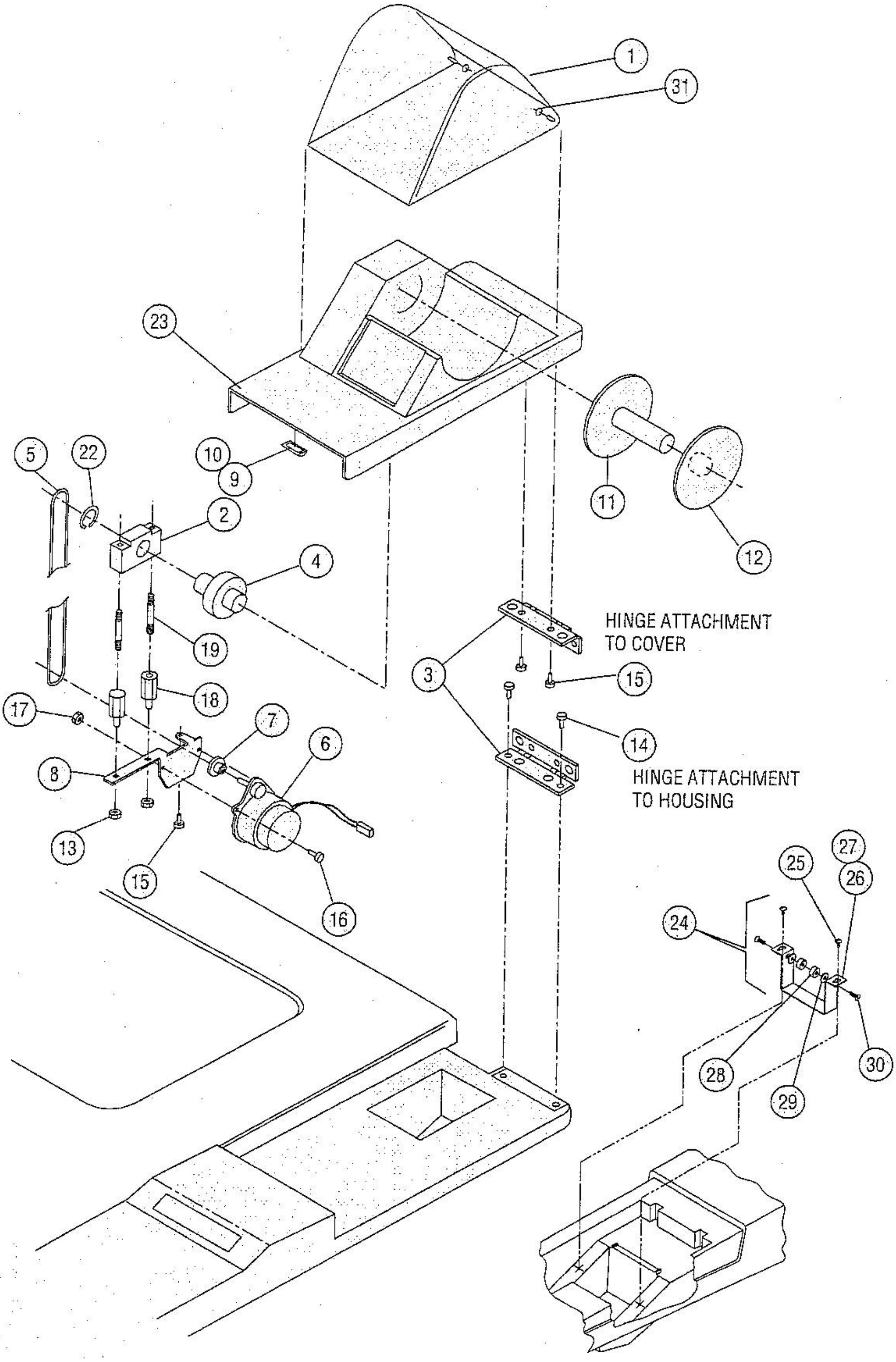

CONTROL BOARD MODIFICATION REQUIRED FOR REPLACEMENT
SEE NOTE *
REF: J9
REF: J8
R54
R55
R56
TOP VIEW OF CONTROL BOARD (ITEM #10)
ELEVATION VIEW

* *MODIFICATION NOTE: Before installing CONTROL BOARD (Item #10) to shield WELDMENT (Item #12), remove R55 and R56 Resistors. These Resistors are not used in this application, and create an interference.*

Figure 10-15. Control Assembly – 99A1 and A2 Models Only

FIG. & ITEM NO.	PART NUMBER			SVC	DESCRIPTION	UNITS PER ASSEMBLY					
						89A1	90B1	90A1	90A2	99A1	99A2
10-15-	P	146665	360		CONTROL ASSEMBLY, DOMESTIC						X
	P	146665	361		CONTROL ASSEMBLY, INTERNATIONAL					X	
1 - 2					(Item #'s Not Used)						
3	P	129376	375		HOUSING, Take-up Motor (See Figure 10-16)					1	1
4	P	146665	355		HOUSING, Control					1	1
5	P	146665	225		TOUCH PANEL, Domestic					1	—
6	P	146665	367		TOUCH PANEL, International					—	1
7	P	093915	177		DISPLAY					1	1
8	P	093922	504		BRACKET, Display Mounting.					1	1
9	P	093914	003		PRINTER HEADER ASSEMBLY					1	1
10	P	146665	002	*	CONTROL BOARD (See Modification Note)					1	1
	P	129376	188		• FUSE, 630 MA, VDA						
	P	093915	047		• BATTERY, Smart						
	P	755716	763		• PROGRAM CHIP SET						
11	P	146665	359	*	COVER, BTM Board					1	1
12	P	136817	136		WELDMENT, Shield					1	1
13	P	093922	484		BRACKET, Support					1	1
14	P	093912	226		SCREW, Flange Lock, #6-32 x 1/4 Lg.					9	9
15	P	129376	349		PLUG BUTTON					1	1
16	P	129376	340		SCREW, Flange Lock, #6-32 x 3/8 Lg.					9	9
17	P	084121	004		NUT, Keps, #6-32					5	5
18	P	129376	331		STANDOFF, (Male x Female), #6-32 x 3/8 Lg. (Nylon)					6	6
19	P	129376	337		HEADER, Right Angle (15 Pin)					1	1
20	P	129326	001		MOUNT, Cable Tie					1	1
21	P	084104	001		WIRE, Tie					1	1
22	P	093922	499		PRINTER HARNESS ASSEMBLY (See Figure 10-26)					1	1
23	P	093922	498		DISPLAY HARNESS ASSEMBLY (See Figure 10-25)					1	1
24	P	136817	129		SERIAL PORT HARNESS					1	1
25	P	129376	338		HEADER, Straight (5 Pin)					1	1
26	P	129376	332		SCREW, Pan Head, #6-32 x 1/4 Lg. (Nylon)					4	4
27	P	129376	333		NUT, Hex, #6-32 (Nylon)					8	8
28	P	093912	152		STANDOFF, (Male x Female), #6-32 x 3/8 Lg.					1	1
29	P	093912	380		SCREWLOCK KIT					1	1
30	P	093922	077		LABEL (ESD and Shock Hazard)					1	1
31	P	129376	341		BUMPER, Adhesive-Backed					2	2
32	P	129376	347		SCREW, Pan Head, #6-32 x 1/2 Lg. (Nylon)					2	2
33	P	093912	157		STANDOFF, (Male x Female), #6-32 x 1" Lg.					2	2

* *MODIFICATION NOTE: Before installing CONTROL BOARD (Item #10) to shield WELDMENT (Item #12), remove R55 and R56 Resistors. These Resistors are not used in this application, and create an interference.*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HINGE ATTACHMENT TO COVER
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HINGE ATTACHMENT TO HOUSING
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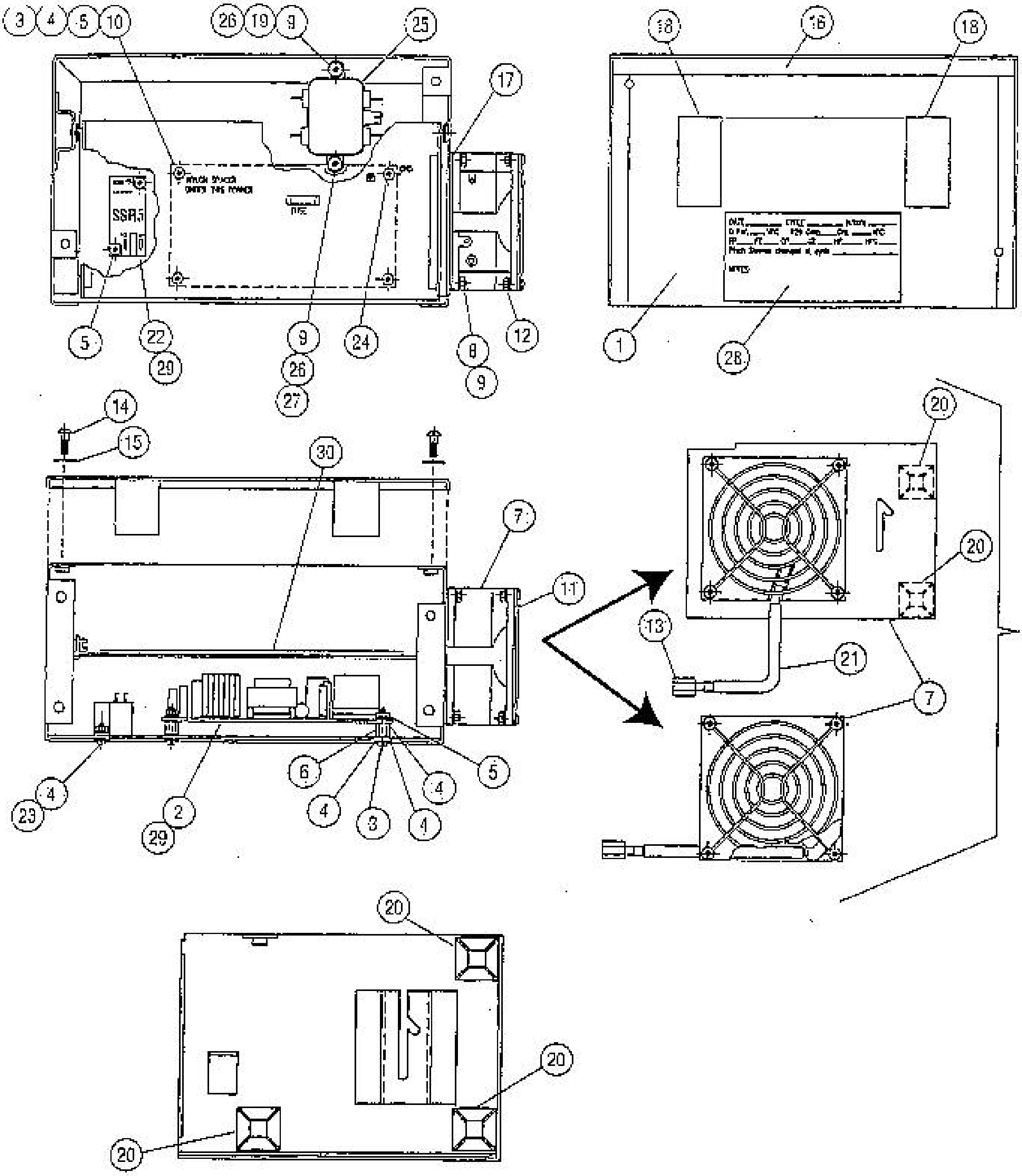
Figure 10-16. Take-Up Motor Components – 99A1 and A2 Models Only

FIG. & ITEM NO.		PART NUMBER		SVC	DESCRIPTION	UNITS PER ASSEMBLY					
						89A1	90B1	90A1	90A2	99A1	99A2
10-16-					**TAKE-UP MOTOR COMPONENTS** .... **(99A1/A2 MODELS ONLY)**					X	X
1	P	146665	368		Take-Up Motor Cover					1	1
2	P	093922	505		ASSEMBLY, Pillow Block					1	1
3	P	093922	485		HINGE, Rear					1	1
4	P	093922	478		ASSEMBLY, Magnet Spindle					1	1
5	P	129376	326		BELT, O-ring					1	1
6	P	093922	486		MOTOR, Gear CCW					1	1
7	P	129376	327		PULLEY, Gear Motor					1	1
8	P	136817	131		BRACKET, Motor Mounting					1	1
9	P	150475	014		MAGNET, Catch					1	1
10	P	129376	329		STRIKE, Steel					1	1
12	P	093922	481		STUD, Spool					1	1
13	P	150828	316		NUT, Flange Lock #8-32					2	2
14	P	093912	226		SCREW, Flange Lock #6-32 x 1/4 Lg					2	2
15	P	129376	340		SCREW, Flange Lock #6-32 x 3/8 Lg					3	3
16	P	093908	032		SCREW, Sems #4-40 x 1/2 Lg					2	2
17	P	084121	003		NUT, Keps, #4-40					2	2
18	P	129376	339		STANDOFF (Male x Female), #8-32 x 3/4 Lg					2	2
19	P	129376	342		STUD, Threaded, #8-32 x 1-7/16 Lg					2	2
20		400034			LOCTITE #242 (Not Shown)					A/R	A/R
21	P	129362	819		ROLL, Paper (3 Rolls) (Not Shown)					A/R	A/R
22	P	129376	348		RING, Retaining					1	1
23	P	146665	356		HOUSING, Take-Up Motor					1	1
24	P	129373	950	*	KIT, Spindle Mounting					X	X
25	P	074647	061		• SCREW, Self-Tapping, #4 x 1/4" Lg.					2	2
26	P	093921	177		• MOUNTING ASSEMBLY, Spindle					X	X
27	P	093921	219		• BRACKET, Spindle Mount					1	1
28	P	129373	947		• SPINDLE					2	2
29	P	081673	004		• WASHER, Flat, #6					2	2
30	P	084119	002		• SCREW, Flat Head, #6 x 3/8" Lg.					2	2
31	P	091007	091		WASHER, NYLON					2	2
32	P	093922	479		ASSEMBLY, Spool					1	1

NOTE:

** Early versions of 99A1 and 99A2 units may not be equipped with a spindle mount. Spindle mount can be added to 99A1 or 99A2 units by ordering and installing Item #24.*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SSR5
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IMPORTANT: Fan Detail May Vary

INSIDE VIEW OF ENCLOSURE

Figure 10-17. Electronic Enclosure Assembly – 89 and 90 Models Only

FIG. & ITEM NO.	PART NUMBER	SVC	DESCRIPTION	UNITS PER ASSEMBLY					
				89A1	90B1	90A1	90A2	99A1	99A2
10-17-	200184		**ELECTRONIC ENCLOSURE ASSEMBLY** **(89/90 MODELS ONLY)**	X	X	X	X		
1	100242		COVER, Electronic Enclosure	1	1	1	1		
2	500068		SUPPLY, Power	1	1	1	1		
3	451601		SCREW, Pan Head, SS, #4-40 x 5/6" Lg.	4	4	4	4		
4	450202		WASHER, Flat, SS, #4	14	14	14	14		
5	453000		NUT, Keps, #4-40	6	6	6	6		
6	451200		SPACER, Hex, #4-40 x 1/4" Lg.	3	3	3	3		
7	200065	*	FAN, Cooling, 230V, 50Hz	–	1	1	–		
	200142	*	FAN, Cooling, 120V, 50/60Hz	1	–	–	1		
8	451804		SCREW, Flat Head, SS, #6-32 x 1/2" Lg.	3	3	3	3		
9	453001		NUT, Keps, #6-32	10	10	10	10		
10	451203		SPACER, Hex, Nylon, #4-40 x 1/4" Lg.	1	1	1	1		
11	400057		GUARD, Finger	1	1	1	1		
12	453004		NUT, #6-32	A/R	A/R	A/R	A/R		
13	550021		COUPLER, Male, Fully Insulated, .250 x .032	2	2	2	2		
14	451904		SCREW, Hex. Socket Button Head, SS, #8-32 x 1/2" Lg.	2	2	2	2		
15	450203		WASHER, Flat, SS, #8	2	2	2	2		
16	400059		TAPE, Foam, 3/8" Wide x 1/8" Thick x 20' Lg.	1	1	1	1		
17	100334		SCREEN, Fan	1	1	1	1		
18	100345		BLOCK, Foam	2	2	2	2		
19	451802		SCREW, Hex. Socket Button Head, SS, #6-32 x 3/8" Lg.	5	5	5	5		
20	400037		MOUNT, Ty-Pad, Adhesive Backed	5	5	5	5		
21	400193		TUBING, Insulated	A/R	A/R	A/R	A/R		
22	500040		RELAY, Solid State (SSR5)	1	1	1	1		
23	451602		SCREW, Hex. Socket Button Head, SS, #4-40 x 3/8" lg.	2	2	2	2		
24	450217		LOCKWASHER, External Tooth, #4	1	1	1	1		
25	500088		FILTER, Line	1	1	1	1		
26	450205		WASHER, Flat, SS, #6	2	2	2	2		
27	451808		SCREW,Hex. Socket Button Head, SS, #6-32 x 1/4" Lg.	1	1	1	1		
28	101012		LABEL, Service	1	1	1	1		
29	300074		CABLE (From Power Supply to Line Filter)	1	1	1	1		
30	300076		BOARD, P.C. Interface Control (See Fig 10-13)	1	1	–	–		
	300086		BOARD, Control, P.C. Interface	–	–	1	1		
	53B0400		• CHIP, Battery RAM	–	–	1	1		

** Verify which fan is in use on the SYSTEM 1 being repaired.*

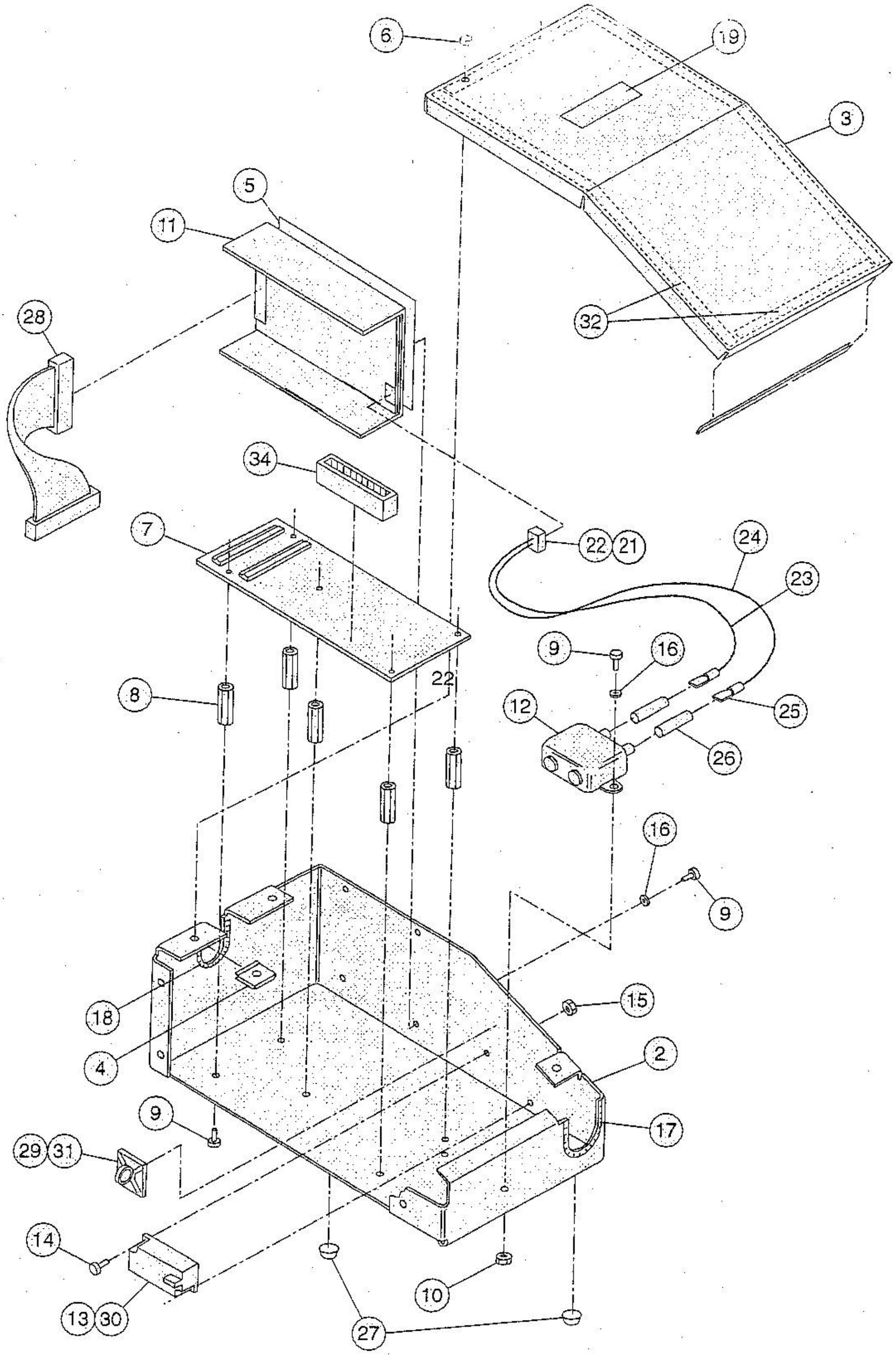
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Figure 10-18. Interface Box Assembly – 99A1 and 99A2 Models Only

FIG. & ITEM NO.	PART NUMBER			S V C	DESCRIPTION	UNITS PER ASSEMBLY					
						89A1	90B1	90A1	90A2	99A1	99A2
10-18-	P	146665	358		**INTERFACE BOX ASSEMBLY** **(99A1/99A2 MODELS ONLY)**					X	X
1					(Item # Not Used)						
2	P	146665	352		WELDMENT, Interface Box					1	1
3	P	146665	353		COVER, Interface Box					1	1
4	P	129376	354		NUT, Retaining, #10-32					3	3
5				*	PAD, Insulating (Not by STERIS)					A/R	A/R
6	P	081689	004		SCREW, Truss Head, Machine, #10-32 UNF x 3/8"					3	3
7	P	093915	200		ASSEMBLY, Interface Board					1	1
8	P	129376	328		STANDOFF, #6-32 x 1" (Female x Female)					5	5
9	P	093908	033		SCREW, Sems, #6-32 UNC x 1/4"					11	11
10	P	084121	004		NUT, Keps, #6-32 UNC					2	2
11	P	136817	016		SUPPLY, Power					1	1
12		500088			FILTER, Line					1	1
13		500040			RELAY, Solid State (SSR5)					1	1
14	P	093908	031		SCREW, Sems, #4-40 UNC x 1/4"					2	2
15	P	084121	003		NUT, Keps, #4-40 UNC					2	2
16	P	084114	002		WASHER, Flat, #6					4	4
17		450403			GROMMET, Flex, 3 5/32" Lg.					1	1
18		450404			GROMMET, Flex, 2 5/8" Lg.					1	1
19	P	093922	077		LABEL (ESD and Shock Hazard)					1	1
20					Item # Not Used						
21	P	129376	120		HOUSING, 5 Position					1	1
22	P	129376	122		TERMINAL, Crimp					2	2
23	R	004018	187		WIRE, White					A/R	A/R
24	R	004018	191		WIRE, Black					A/R	A/R
25		550024			TERMINAL, Female, Fully Insulated, 18-22 AWG					2	2
26		400286			TUBING, Shrink					A/R	A/R
27	P	129376	220		BUMPER, Stick-on					2	2
28	P	136817	130		HARNESS, DC Power Supply					1	1
29	P	084104	001		WIRE, Tie					A/R	A/R
30	P	764327	601		COMPOUND, Thermo (5 oz., Tube)					A/R	A/R
31	P	129326	001		MOUNT, Cable Tie					1	1
32		613046			GASKET, EMI, 36" Lg.					A/R	A/R
33	P	093908	039		SCREW, Sems, #6-32 UNC x 3/8"(PCB Board Hold Down) (Not Shown)					5	5
34		45B60300			BLOCK, Terminal, 12-Circuit					1	1

NOTES

** Cat #5300AC, Thermesil III – cut material to 2.875" wide x 4.75" long.*

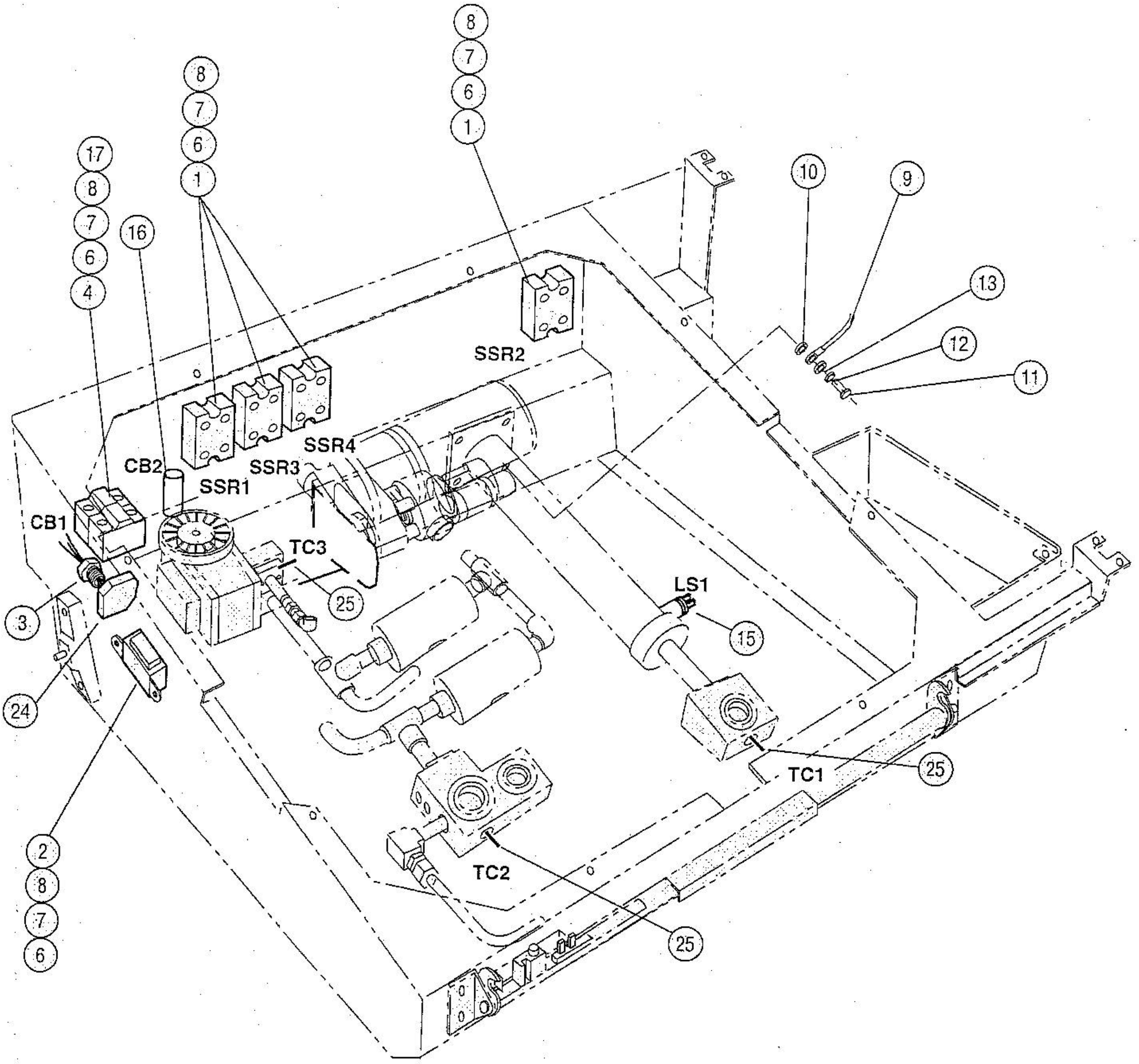

8
7
6
1
8
7
6
1
17
8
7
6
4
16
10
9
13
12
11
SSR2
SSR4
SSR3
CB2
SSR1
CB1
TC3
25
LS1
15
3
24
25
TC1
TC2
25
2
8
7
6

Figure 10-19. Electrical Components

FIG. & ITEM NO.	PART NUMBER	SVC	DESCRIPTION	UNITS PER ASSEMBLY 89A1	90B1	90A1	90A2	99A1	99A2
10-19-			ELECTRICAL COMPONENTS	X	X	X	X	X	X
1	500059		RELAY, Solid State (SSR1, 2, 3, 4)	4	4	4	4	4	4
2	500079		FILTER, Line	–	–	–	1	–	–
	300099		• CABLE	–	–	–	1	–	–
	300100		• CABLE	–	–	–	1	–	–
3	300071		ASSEMBLY, Power Cord	1	–	–	1	–	–
	500025		PLUG, GFCI Hospital Grade 20 A (Tech Tool)	A/R	A/R	A/R	A/R	A/R	A/R
	400477		OUTLET, GFCI Hospital Grade 20 A, 120V (Scr. & Cover) (Tech Tool)	A/R	A/R	A/R	A/R	A/R	A/R
4	500066		TRANSFORMER, Isolation	1	1	1	1	1	1
5	451802		SCREW, Button Head, #6-32 x 3/8 Lg. (Not Shown)	10	10	10	10	10	10
6	453001		NUT, KEPS, #6-32	10	10	10	10	10	10
7	450205		WASHER, Flat #6	22	22	22	22	22	22
8	450213		WASHER, Lock, #6	6	6	6	6	6	6
9	300065		ASSEMBLY, Cable (Heater to Ground)	1	1	1	1	1	1
10	450221		WASHER, Lock, Internal/External, #10	2	2	2	2	2	2
11	450003		SCREW, Button Head, #10-32 x 3/8 Lg.	2	2	2	2	2	2
12	450201		WASHER, Lock, #10	2	2	2	2	2	2
13	450211		WASHER, Flat, #10	2	2	2	2	2	2
14			(Item # Not Used)						
15	500019		SWITCH, Thermal Cutoff (LS1)	1	1	1	1	1	1
16	500076		BREAKER, Circuit, 0.5A (CB2)	–	–	–	1	–	1
	500075		BREAKER, Circuit, 0.25A (International) (CB2)	–	–	1	–	1	–
17	500081		BREAKER, Circuit, 20A (CB1)	–	–	–	1	–	1
	500067		BREAKER, Circuit, 10A (International) (CB1)	–	–	1	–	1	–
	500012		BREAKER, Circuit, 20A (International) (CB1)	1	1	–	–	–	–
18	300053		HARNESS, Wire (Not Shown)	1	1	1	1	1	1
19	300064		HARNESS, Wire (Not Shown)	1	1	1	1	1	1
20	300068		ASSEMBLY, Cable (Pump to Ground) (Not Shown)	1	1	1	1	1	1
21	300069		ASSEMBLY, Cable (Compressor to Ground) (Not Shown)	1	1	1	1	1	1
22	300074		ASSEMBLY, Cable (RS to Filter) (Not Shown)	1	1	1	1	1	1
23	300014		CABLE, Ribbon (Printer to Controller) (Not Shown)	1	1	1	1	1	1
24	400022		FITTING, Electric Cord, Seal	1	–	–	1	–	1
25	100520		THERMOCOUPLE (TC1, 2, 3)	3	3	3	3	3	3

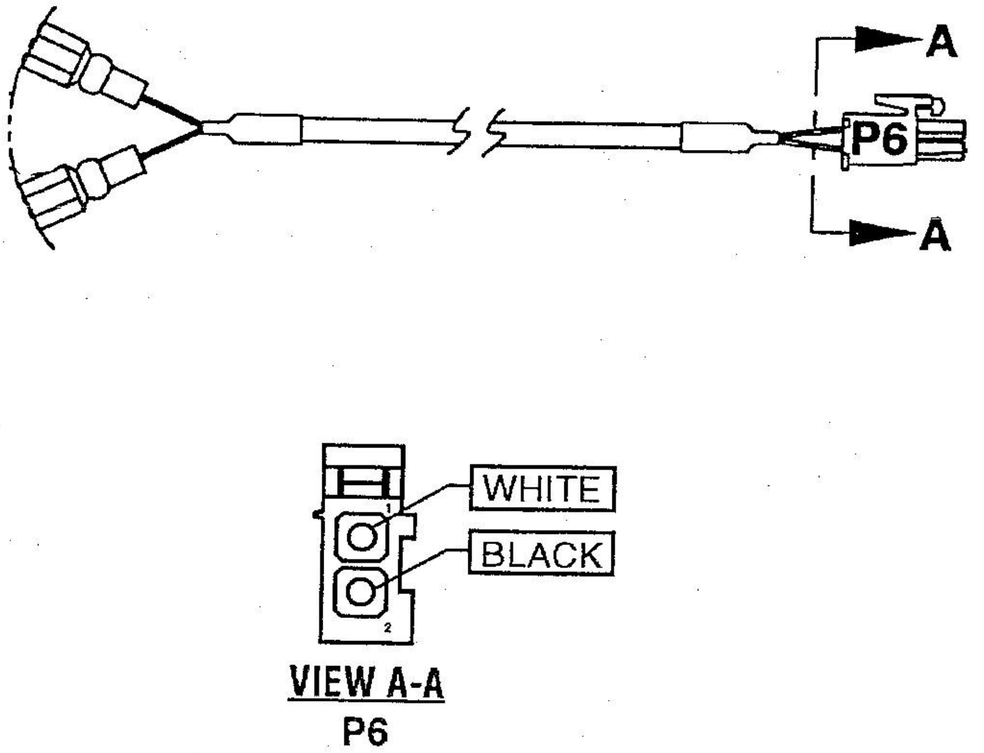
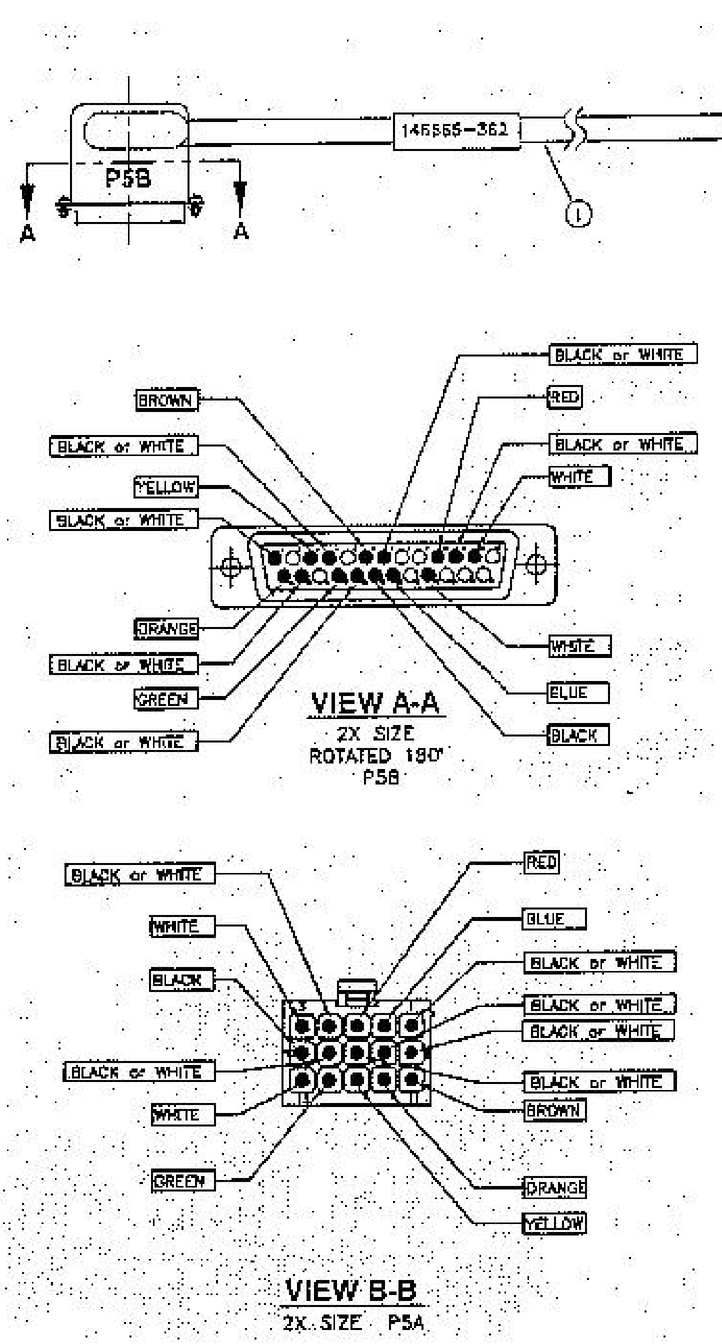

A
P6
A
WHITE
1
BLACK
2
VIEW A-A
P6

FIG. & ITEM NO.	PART NUMBER			SVC	DESCRIPTION	UNITS PER ASSEMBLY					
						89A1	90B1	90A1	90A2	99A1	99A2
10-20	P	136817	135		ASSEMBLY, Transducer Harness					X	X

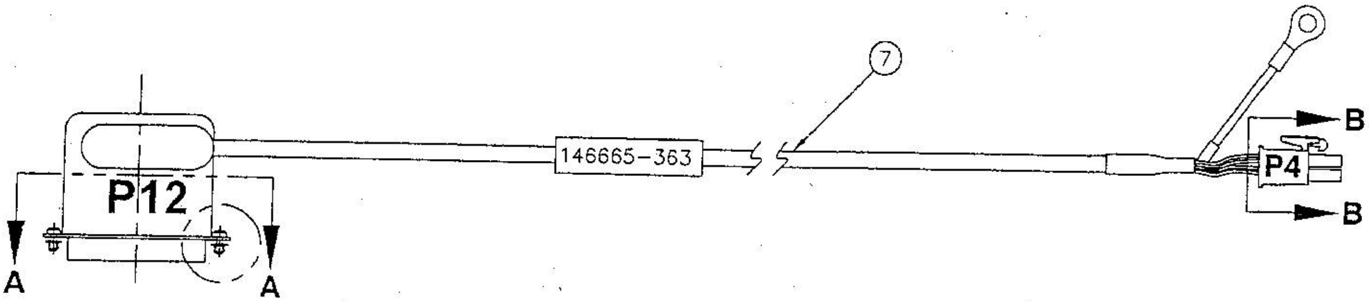
Figure 10-20. Transducer Harness Assembly – 99A1 and A2 Models Only

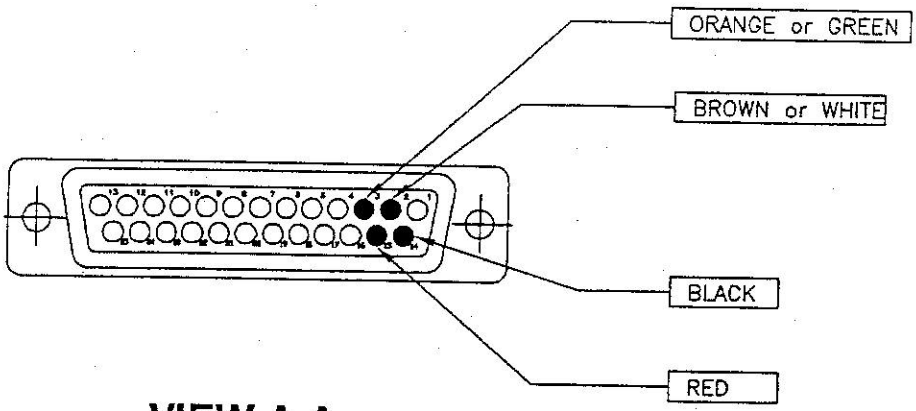

146665-362
P5B
A
A
①
B
P5A
B
BROWN
BLACK or WHITE
YELLOW
BLACK or WHITE
ORANGE
BLACK or WHITE
GREEN
BLACK or WHITE
BLACK or WHITE
RED
BLACK or WHITE
WHITE
WHITE
BLUE
BLACK
VIEW A-A
2X SIZE
ROTATED 180°
P5B
BLACK or WHITE
WHITE
BLACK
BLACK or WHITE
WHITE
GREEN
RED
BLUE
BLACK or WHITE
BLACK or WHITE
BLACK or WHITE
BLACK or WHITE
BROWN
ORANGE
YELLOW
VIEW B-B
2X SIZE P5A

WIRE CHART		
COLOR [illegible]	FROM	TO
BLACK or WHITE	P5A-1	P5B-7
BLUE	P5A-2	P5B-20
RED	P5A-3	P5B-10
BLACK or WHITE	P5A-4	P5B-11
WHITE	P5A-5	P5B-12
BLACK or WHITE	P5A-6	P5B-16
BLACK or WHITE	P5A-7	P5B-1
BLACK or WHITE	P5A-8	P5B-15
BLACK or WHITE	P5A-9	P5B-4
BLACK	P5A-10	P5B-19
BROWN	P5A-11	P5B-6
ORANGE	P5A-12	P5B-14
YELLOW	P5A-13	P5B-3
GREEN	P5A-14	P5B-17
WHITE	P5A-15	P5B-22
BLACK	DRAIN WIRE	RING TERM

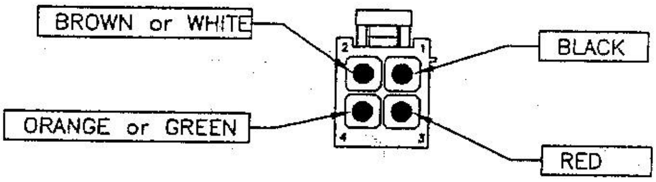
FIG. & ITEM NO.	PART NUMBER			SVC	DESCRIPTION	UNITS PER ASSEMBLY					
						89A1	90B1	90A1	90A2	99A1	99A2
10-21	P	146665	362		ASSEMBLY, Analog Cable					X	X

Figure 10-21. Analog Cable Assembly – 99A1 and A2 Models Only


P12
A
A
146665–363
7
P4
B
B


ORANGE or GREEN
BROWN or WHITE
BLACK
RED
13
12
11
10
9
8
7
6
5
4
3
2
1
25
24
23
22
21
20
19
18
17
16
15
14

VIEW A-A
2X SIZE
ROTATED 180°
P12

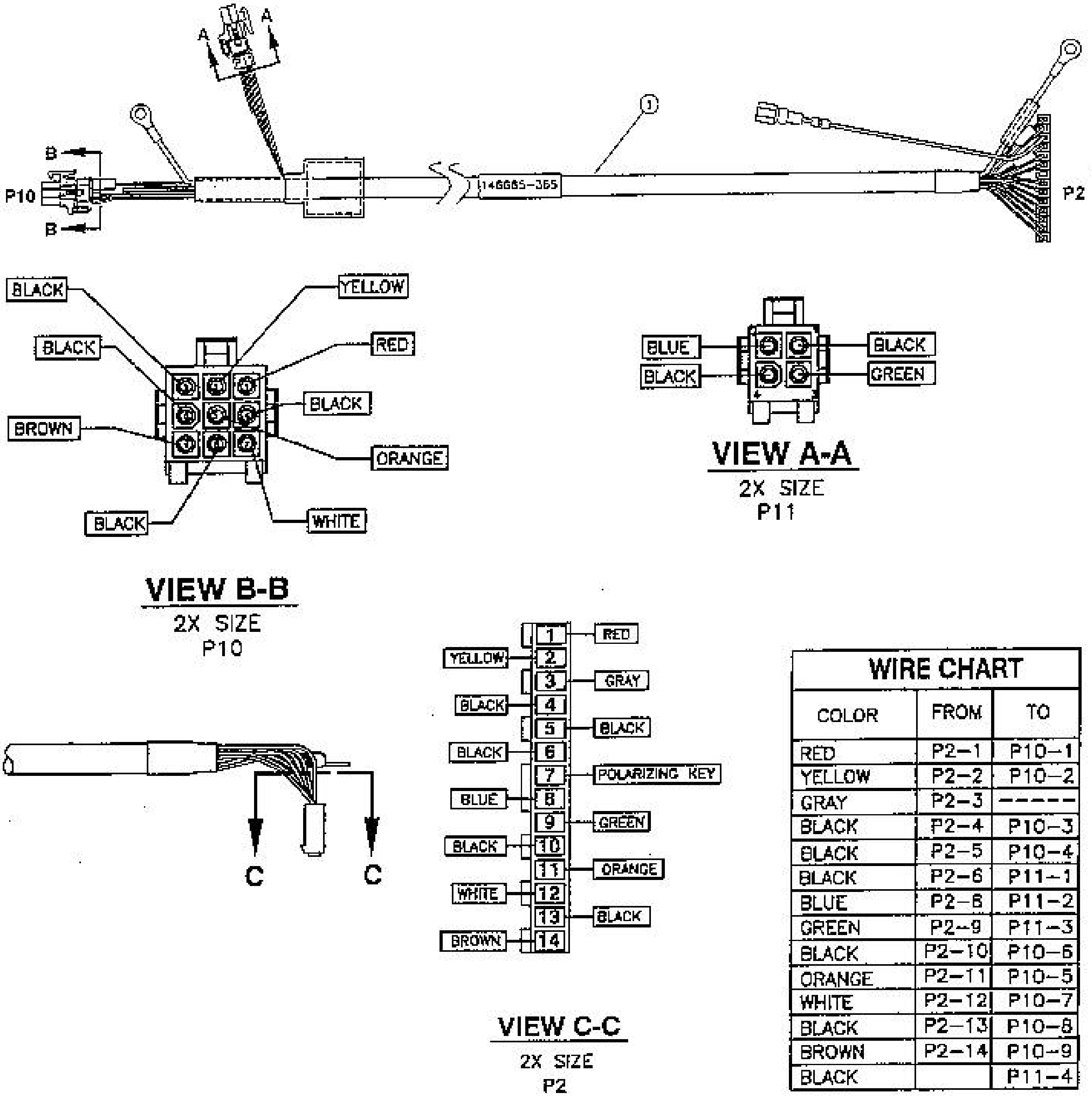

BROWN or WHITE
ORANGE or GREEN
BLACK
RED
2
1
4
3

VIEW B-B
2X SIZE
P4

WIRE CHART		
COLOR (WIRE COLOR MAY VARY, AS NOTED, DUE TO MANUF. MATERIAL USED.)	FROM	TO
BLACK	P4–1	P12–14
WHITE or BROWN	P4–2	P12–2
RED	P4–3	P12–15
GREEN or ORANGE	P4–4	P12–3
BLACK	DRAIN WIRE	RING TERM.

FIG. & ITEM NO.	PART NUMBER			SVC	DESCRIPTION	UNITS PER ASSEMBLY					
						89A1	90B1	90A1	90A2	99A1	99A2
10-22	P	146665	363		DC Input Harness					X	X

Figure 10-22. DC Input Harness – 99A1 and A2 Models Only

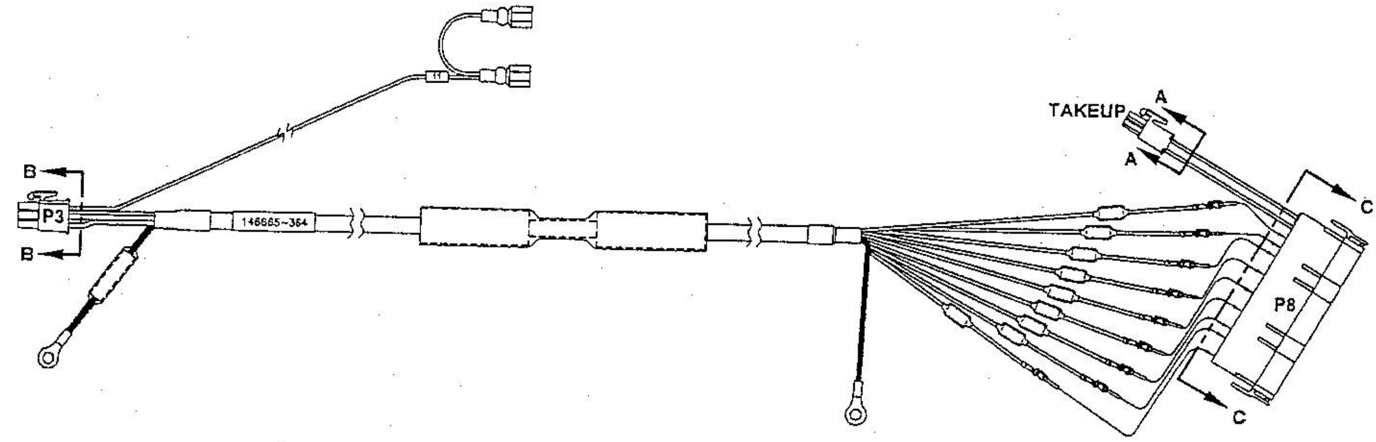

A
A
B
B
P10
①
146665-365
P2
BLACK
YELLOW
BLACK
RED
BLACK
BROWN
ORANGE
BLACK
WHITE
VIEW B-B
2X SIZE
P10
BLUE
BLACK
BLACK
GREEN
VIEW A-A
2X SIZE
P11
C
C
1
RED
YELLOW
2
3
GRAY
BLACK
4
5
BLACK
BLACK
6
7
POLARIZING KEY
BLUE
8
9
GREEN
BLACK
10
11
ORANGE
WHITE
12
13
BLACK
BROWN
14
VIEW C-C
2X SIZE
P2

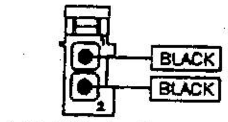
WIRE CHART

COLOR	FROM	TO
RED	P2-1	P10-1
YELLOW	P2-2	P10-2
GRAY	P2-3	-----
BLACK	P2-4	P10-3
BLACK	P2-5	P10-4
BLACK	P2-6	P11-1
BLUE	P2-8	P11-2
GREEN	P2-9	P11-3
BLACK	P2-10	P10-6
ORANGE	P2-11	P10-5
WHITE	P2-12	P10-7
BLACK	P2-13	P10-8
BROWN	P2-14	P10-9
BLACK		P11-4

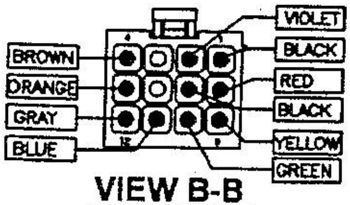
FIG. & ITEM NO.	PART NUMBER			SVC	DESCRIPTION	UNITS PER ASSEMBLY					
						89A1	90B1	90A1	90A2	99A1	99A2
10-23	P	146665	365		DC Power Harness					X	X

Figure 10-23. DC Power Harness – 99A1 and A2 Models Only

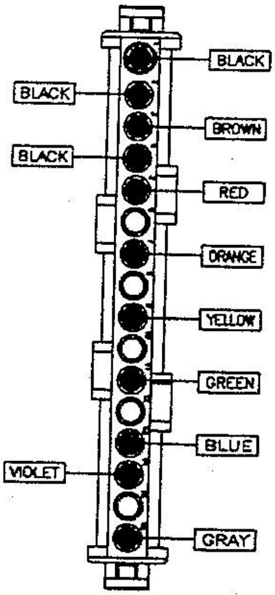

B
P3
B
146665-364
TAKEUP
A
A
C
P8
C


BLACK
BLACK
2

VIEW A-A
2X SIZE
(TAKEUP)


VIOLET
4
1
BROWN
BLACK
ORANGE
RED
GRAY
BLACK
BLUE
12
9
YELLOW
GREEN

VIEW B-B
2X SIZE
P3


BLACK
BLACK
BROWN
BLACK
RED
ORANGE
YELLOW
GREEN
BLUE
VIOLET
GRAY

VIEW C-C
2X SIZE
P8

WIRE CHART			
COLOR	LENGTH	FROM	TO
BLACK	4"	P8-1	TAKEUP-1
BLACK	4"	P8-2	TAKEUP-2
BROWN	36 5/8"	P8-3	P3-4
BLACK	36 3/8"	P8-4	P3-6
RED	36 1/8"	P8-5	P3-5
ORANGE	36"	P8-7	P3-8
YELLOW	35 7/8"	P8-9	P3-9
GREEN	35 3/4"	P8-11	P3-10
BLUE	35 5/8"	P8-13	P3-11
VIOLET	35 3/8"	P8-14	P3-2
GRAY	34 3/8"	P8-16	P3-12
BLACK	12"	P3-1	-----
BLACK	2"	-----	-----

FIG. & ITEM NO.	PART NUMBER			SVC	DESCRIPTION	UNITS PER ASSEMBLY					
						89A1	90B1	90A1	90A2	99A1	99A2
10-24	P	146665	364		AC Output Harness					X	X

Figure 10-24. AC Output Harness – 99A1 and 99A2 Models Only
(Some Details May Vary)

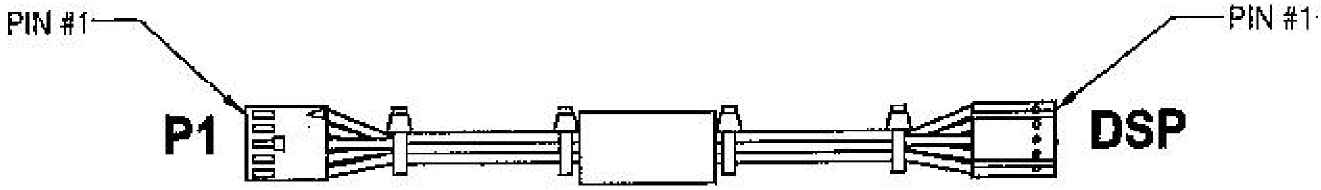


FIG. & ITEM NO.	PART NUMBER			SVC	DESCRIPTION	UNITS PER ASSEMBLY					
						89A1	90B1	90A1	90A2	99A1	99A2
10-25	P	093922	498		ASSEMBLY, Display Harness					X	X

Figure 10-25. Display Harness Assembly – 99A1 and 99A2 Models Only

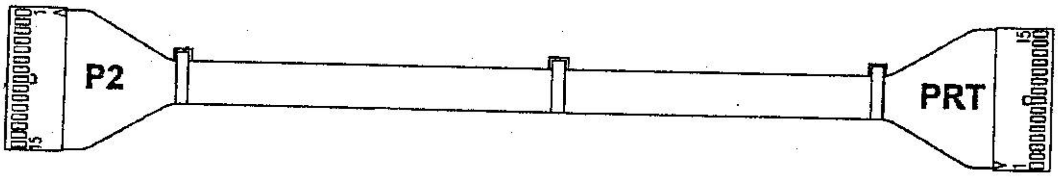
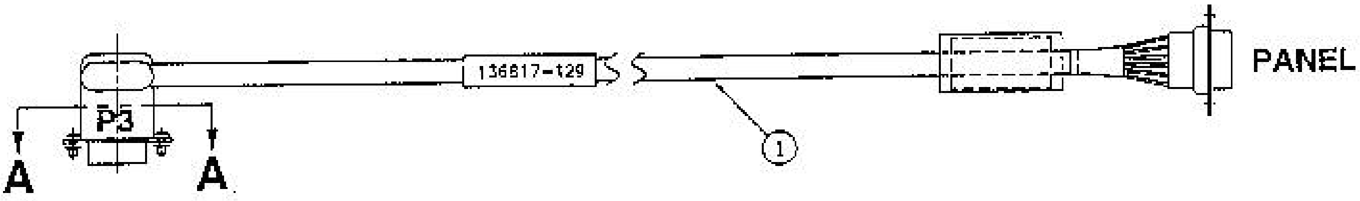
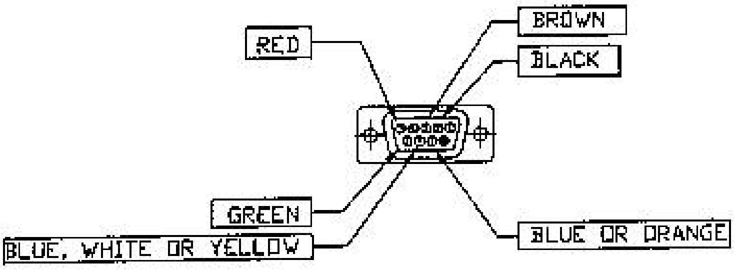


FIG. & ITEM NO.		PART NUMBER		SVC	DESCRIPTION	UNITS PER ASSEMBLY					
						89A1	90B1	90A1	90A2	99A1	99A2
10-26	P	093922	499		ASSEMBLY, Printer Harness					X	X

Figure 10-26. Printer Harness Assembly – 99A1 and A2 Models Only


136817-129
P3
A
A
1
PANEL


RED
BROWN
BLACK
GREEN
BLUE, WHITE OR YELLOW
BLUE OR ORANGE

DETAIL A-A

WIRE CHART		
COLOR (WIRE COLOR MAY VARY, AS NOTED, DUE TO MANUF. MATERIAL USED)	FROM	TO
BLACK	P3-2	PANEL-2
BROWN	P3-3	PANEL-3
RED	P3-5	PANEL-5
ORANGE or BLUE	P3-7	PANEL-7
BLUE, WHITE or YELLOW	P3-8	PANEL-8
GREEN	P3-9	PANEL-9

FIG. & ITEM NO.	PART NUMBER			SVC	DESCRIPTION	UNITS PER ASSEMBLY					
						89A1	90B1	90A1	90A2	99A1	99A2
10-27	P	136817	129		Serial Port Harness					X	X

Figure 10-27. Serial Port Harness – 99A1 and A2 Models Only

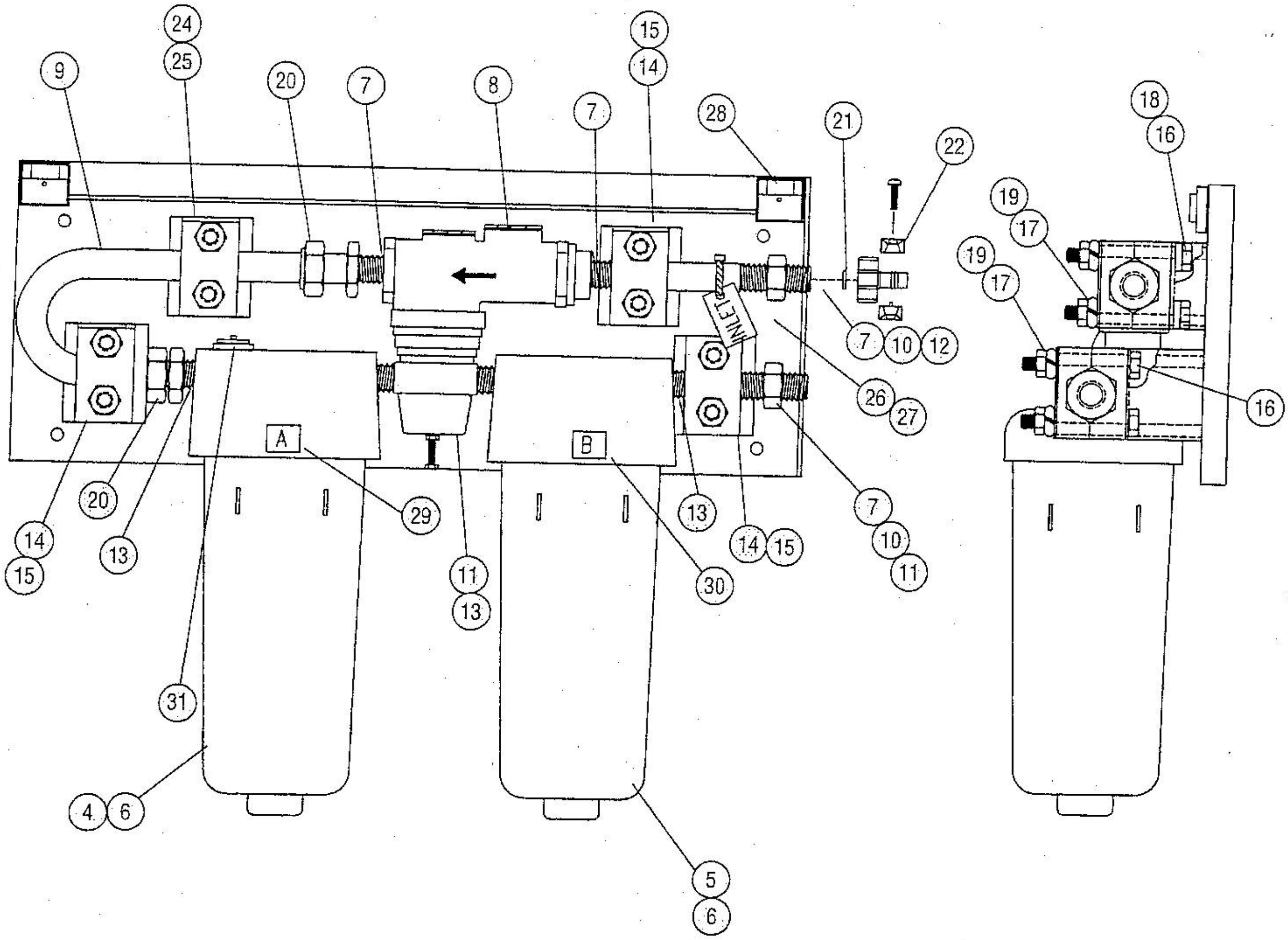

24
25
9
20
7
8
15
14
7
28
21
22
18
16
19
17
19
17
INLET
7
10
12
26
27
16
A
B
20
14
15
13
29
11
13
31
13
14
15
7
10
11
30
4
6
5
6

Figure 10-28. Dual Pre-Filter Assembly

FIG. & ITEM NO.	PART NUMBER	SVC	DESCRIPTION	UNITS PER ASSEMBLY					
				89A1	90B1	90A1	90A2	99A1	99A2
10-28-	A1550		**DUAL PRE-FILTER ASSEMBLY** (English)	X	X		X		X
	A1552		**DUAL PRE-FILTER ASSEMBLY** (German/English)			X		X	
	A1553		**DUAL PRE-FILTER ASSEMBLY** (French/English)			X		X	
	A1554		**DUAL PRE-FILTER ASSEMBLY** (Italian/English)			X		X	
	A1555		**DUAL PRE-FILTER ASSEMBLY** (Spanish/English)			X		X	
1	100430		COVER (Not Shown)	1	1	1	1	1	1
	100534		• LABEL, Shock Hazard (German/English)			1		1	
	100670		• LABEL, Shock Hazard (French/English)			1		1	
	100669		• LABEL, Shock Hazard (Italian/English)			1		1	
	100784		• LABEL, Shock Hazard (Spanish/English)			1		1	
	100435		• LABEL, Reversing (English)	1	1	1	1	1	1
	100535		• LABEL, Reversing (German/English)			1		1	
	100668		• LABEL, Reversing (French/English)			1		1	
	100586		• LABEL, Water Connect, Top (German/English)			1		1	
	100667		• LABEL, Reverse (Italian/English)			1		1	
	100783		• LABEL, Reverse (Spanish/English)			1		1	
	100788		• LABEL (Italian/English)						
	100375		• LOGO, Prefilter System	1	1	1	1	1	1
	100432		• LABEL, Shock Hazard (English)	1	1	1	1	1	1
2			(Item Not Used)						
3	A1551		PRE-FILTER, A & B Replacement	A/R	A/R	A/R	A/R	A/R	A/R
4	A1501		• CARTRIDGE, A, Pre-filter	1	1	1	1	1	1
5	A1504		• CARTRIDGE, B, Pre-filter	1	1	1	1	1	1
6	400158		HOUSING, B	1	1	1	1	1	1
	400356		• BOWL, Plastic	1	1	1	1	1	1
	400160		HOUSING, A	1	1	1	1	1	1
	400356		• BOWL, Plastic	1	1	1	1	1	1
7	400036		SEALANT	A/R	A/R	A/R	A/R	A/R	A/R
8	400081		REGULATOR, Pressure (Max., Inlet Pressure, 300 psi)	1	1	1	1	1	1
9	100541		ELBOW, Return	1	1	1	1	1	1
10	400192		ADAPTER	2	2	2	2	2	2
11	100425		PIPE, Brass, Threaded	2	2	2	2	2	2
12	100426		PIPE, Brass, Threaded	1	1	1	1	1	1
13	400150		TAPE, Pipe Thread Seal	A/R	A/R	A/R	A/R	A/R	A/R
14	400187		CLAMP, Standard, Half	6	6	6	6	6	6
15	400188		PLATE, Cover, Standard	3	3	3	3	3	3
16	452104		SCREW, Hex Head 1/4-20 x 2-1/4" Lg.	8	8	8	8	8	8
17	450207		WASHER, Split lock, 1/4"	8	8	8	8	8	8
18	450208		WASHER, Flat, 1/4"	4	4	4	4	4	4
19	453006		NUT, Hex, 1/4-20	8	8	8	8	8	8
20	400290		CONNECTOR, Male	2	2	2	2	2	2
21	200257		Hose Coupler Kit	2	2	2	2	2	2
22	400072		(Item Not Used)	2	2	2	2	2	2
23	400507		WRENCH, Pre-filter (Tool, Not Shown)	A/R	A/R	A/R	A/R	A/R	A/R
24	400189		CLAMP, Standard, Half	2	2	2	2	2	2
25	400190		PLATE, Cover, Standard	2	2	2	2	2	2
26	100431		LABEL, Inlet	1	1	1	1	1	1
27	400166		TWIST-TIE	1	1	1	1	1	1
28	400196		CATCH, Magnetic	2	2	2	2	2	2
29	100436		LABEL, Filter Indent "A"	2	2	2	2	2	2
30	100437		LABEL, Filter Indent "B"	2	2	2	2	2	2
31	400357		BUTTON, Pressure Relief	1	1	1	1	1	1

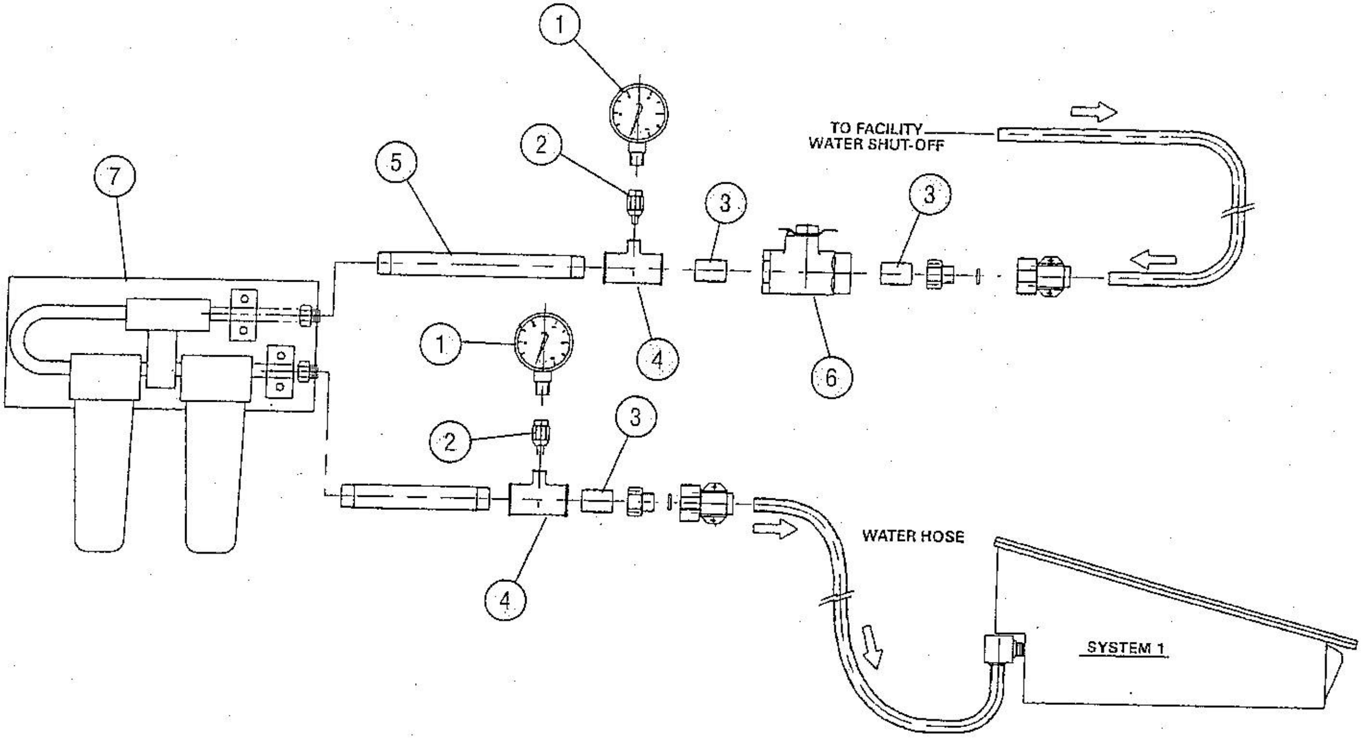

1
2
5
7
3
3
TO FACILITY WATER SHUT-OFF
4
6
1
2
3
4
WATER HOSE
SYSTEM 1

Figure 10-29. Gauge Installation Package

FIG. & ITEM NO.		PART NUMBER		SVC	DESCRIPTION	UNITS PER ASSEMBLY					
						89A1	90B1	90A1	90A2	99A1	99A2
10-29-	P	755716	468		**GAUGE INSTALLATION PACKAGE**	X	X	X	X	X	X
1	P	764328	468		GAUGE, Pressure 0-100 psi	2	2	2	2	2	2
2	P	764328	700		SNUBBER, 1/4" NPT	2	2	2	2	2	2
3	P	029290	091		NIPPLE, 3/4" NPT x 1" Lg.	3	3	3	3	3	3
4	P	084323	001		TEE, Reducing, 3/4" x 3/4" 1/4" NPT	2	2	2	2	2	2
5	P	029314	001		NIPPLE, 3/4" NPT x 7" Lg.	1	1	1	1	1	1
6	P	047601	091		VALVE, Ball, 3/4" NPT	1	1	1	1	1	1
7					ASSEMBLY, Dual Pre-Filter (See Fig. 10-28)	1	1	1	1	1	1

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